Lucent Technologies
Bell Labs Innovations

WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Installation Manual and System Turn-up Services

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For technical support information, refer to "Technical Support Functions" in Chapter 1.

This document was developed by the Customer Technical Support organization.

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1. Language of statute.

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Document Title: **WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Installation Manual and System Turn-up Services.**

Document Number: **365-371-206** Issue Number: **Issue 4** Publication Date: **October 2001**

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	Excellent	Good	Fair	Poor
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About This Document

About this Document

Purpose

This WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Installation Manual and System Turn-up Services provides information for installation of WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) systems.

Intended Audiences

This Installation Manual is primarily for planners and engineers responsible for planning and for installers and technicians responsible for performing installations.

Reason for Reissue

Issue 4 provides updates for Release 6.

How to Use This Manual

This manual is divided into four parts, with several chapters within the parts. Part 1A includes Physical and Power Installation. Part 1B Provides Stand Alone Installation Test, Part 2A includes Span Testing, and Part 2B includes Ring Testing. Chapter 1 provides planning information for using other chapters in the document. Chapters after Chapter 1 are the actual installation procedures and typically are stand-alone documents.

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Providing Feedback on Documentation

How to Comment on This Document

This manual was developed by the Technical Support Services (TSS), Product Support for WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) organization. The TSS, Product Support Group welcomes your comments. A feedback form is located immediately after the title page of this document. Please fill out the form and fax it to 1-978-960-1665.

If the feedback form is missing, fax your comments on this document to 1-978-960-1665.

Overall Installation and Test Planning

1

Contents

Background

Introduction The purpose of this chapter is to provide the information needed to plan the installation of WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) systems.

For the WaveStar™ TDM 10G (OC-192) (2-Fiber), this Installation Manual is for NEW 10G installations ONLY.

Objectives This chapter provides information to perform the following:

1. Overall installation job planning

2. Identify required tools and test equipment

3. List safety instructions

4. Identify documents and drawings

5. Identify available training classes

6. Identify technical support functions

Related information For related information on the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) systems, refer to the "Documents and Drawings" section of this chapter.

Installation Planning

Scope of job

Installation of the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) equipment is similar to other lightwave telecommunications equipment. The general phases of the installation job are:

1. Prepare installation area for new equipment.

2. Physically install WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) equipment.

3. Cable (copper and fiber) the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) equipment.

4. Power up the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) equipment and install software and circuit packs.

5. Perform basic provisioning.

6. Perform local tests at each network element.

7. Connect WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) to outside plant fiber and establish network.

8. Perform system tests and connect traffic to WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber).

9. Turn over system to local operations and maintenance personnel.

Items 2 through 9 are included in this document. Item 1 is beyond the scope of this document.

Equipment Installation

Use Part 1A, including chapters 2 and 3 of this document to perform the physical installation of the 2.5G/10G (2-Fiber) equipment.

In-Place Testing

Use Part 1B, including chapters 4 through 6 of this document to perform the 2.5G/10G (2-Fiber) turn up and testing within the office where the equipment is located.

System Testing

Use Parts 2A and 2B, including chapters 7 and 8 of this document to perform the 2.5G/10G (2-Fiber) turn up and testing between network elements.

System Building Blocks

Network Element Types

The WaveStar™ 2.5G standalone shelf can be configured as a Network Element in a two-fiber BLSR OC-48 ring. The WaveStar™ 10G can be configured as a Network Element in both a two-fiber BLSR OC-48 ring and a two-fiber BLSR OC-192 ring. The 10G can also be configured without OC-192 optics for bandwidth trading applications. Either system can also be configured with OC-48 1+1 or UPSR protection groups as well as OC-3 1+1 and OC-12 1+1 or UPSR.

Physical Installation

The WaveStar™ TDM 2.5G standalone system can be installed with one, two, or three network elements in one bay frame.

The WaveStar™ TDM 10G (OC-192) (2-Fiber) system consists of one 10G shelf and up to two 2.5G shelves with full STS-192 access to each of the two 2.5G shelves, installed within the same bay frame. The 10G system can also be installed with one 10G shelf and up to four 2.5G shelves, where two additional 2.5G shelves are installed in an adjacent bay frame.

Additional Information

For additional information on features and applications refer to the appropriateWaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Applications and Planning Guides.

Tools and Test Equipment

General
This Section lists the tools and test equipment needed for installing and testing WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) system(s).

Tools
Listed below are the tools needed while installing and testing.

Description	Commercial or COMCODE	Notes
Anti-oxidation Material	NO-OX-ID "A" Compound	Needed only if cabinet or shelf has been scraped to make ground connection
ESD (Electrostatic discharge) wrist strap	CC900486994 (R TOOL #4987B)	For ESD protection
Alcohol and wipes		For fiber cleaning
Metral Pin Repair Kit (optional, as required)	BERG MT370-01 Kit 106423859	For replacing any damaged METRAL pins
Insertion/Extraction Tool Kit (optional, as required)	AMP 91261-1	For replacing ACTION PIN contacts in AMPLIMITE HDP-20 connectors (d-sub connectors)
Crimping tool	Thomas & Betts TBM5 or TBM5S or equivalent	For power cable compression taps
Die for Crimping tool	Brown or Pink Die or equivalent	For power cable compression taps
Fiber Installation Tool	CC848439543	For installing fiber connectors and LBOs
Optical Power Meter	Noyes OPM4 or HP E5970A or equivalent	For measuring transmitted optical power of OC3, OC12, OC48, and OC192 units

Tools and Test Equipment (Continued)

Test Equipment   Listed below is the test equipment needed while installing and testing.

Description	Commercial or COMCODE	Notes
Multimeter	Fluke 8060A (ITE #5632 or ITE #6379A) or equivalent.	For measuring 40-60 V DC and ground continuity
Optical power meter with appropriate connectors	HP8140A equipped with HP81401A (ITE #6550) NOYES OPM4-4C or equivalent.	For optical power measurements at 1310 and 1550 nm wavelengths
Bit Error Rate Test Set to transmit and receive a standard DS3/EC1 signal	HP 37717C or equivalent	For testing the cable installation for the DS3/EC1 panels
Ohmmeter	Any standard ohmmeter	For testing 10G backplane cabling

Test Accessories   Listed below are the test accessories needed while installing and testing.

Description	Commercial or COMCODE	Notes
ESD wrist strap	900486994 (R TOOL #4987B)	For ESD protection
Single Mode Fiber jumpers with appropriate connectors (2 jumpers needed)	From ED7R010-31 or equivalent	For optical local tests. (Minimum 2 ft. length) with yellow cladding
Optical Attenuators	Refer to WaveStar™ 2.5G/10G 2F Applications and Planning Guide 365-371-201	To enable loopbacks on the faceplate or LGX.
Guide Pins		For temporary shelf support during shelf installation

Tools and Test Equipment (Continued)

Craft Interface Terminal Requirements for WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber)

The minimum requirements needed to run the WaveStar™ CIT are:

- Windows® NT 4.0 or Windows 2000 Operating System

- Processor:
    - Minimum: Pentium® 266 MHz
    - Recommended:: Pentium®III 500 MHz

- RAM: (minimum)
    - Recommended: 256 MB

- 150MB of free space on drive containing CIT Program

- SVGA monitor (800x600 resolution minimum, 1024x768 recommended)

- Minimum screen size - 11.5 inches (diagonal)

- 1.44 MB 3.5" floppy disk drive

- 6 GB or larger hard drive recommended - see NOTE 1 below

- CD-ROM (16X recommended)

- 10/100BaseT LAN interface network card - PCMCIA card for laptop, PCMCIA drive unit for desktop

- Adobe Acrobat Reader (Version 3.01 or later)

- Third party software for accessing PCMCIA drive with Windows NT (e.g. System Soft's "Card Wizard", Softex' "Card Executive", or TouchStone's "Cardware")

- PCMCIA (Personal Computer Manufacturer's Card Interface Adapter) Type II slot with read/write capability - see NOTE 2 below

    NOTE 1: The laptop computer contains two PCMCIA Type II card slots. One PCMCIA slot must be equipped with the 10BaseT interface network card to support WaveStar™ CIT communication with the NE over the OSI LAN. The second PCMCIA card slot can be used to copy the NE generic software from the laptop to the PCMCIA memory card that is installed into the NE. If a desktop computer will be used for the NE installation process, the desktop computer order should specify a PCMCIA Type II card slot to support copying the NE generic software from the desktop computer to the PCMCIA memory card that is installed into the NE**.**

- FTP server on PC to support the TCP/IP management interface.

Admonishments

Definitions
This manual contains admonishments in the form of DANGERS, WARNINGS, and CAUTIONS. These admonishments, listed in order of priority, have the following definitions:

⚠️ **DANGER:**
Danger shows the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.

⚠️ **WARNING:**
Warning shows the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.

⚠️ **CAUTION:**
Caution shows the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided. Caution is also used for property-damage-only accidents. This includes equipment damage, loss of software, or service interruption.

Personal Safety Instructions

**General
Instructions**

READ AND UNDERSTAND ALL INSTRUCTIONS

When using this telecommunication equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- Follow all warnings and instructions marked on the product.

- Opening or removing rear covers or sheet-metal parts may present exposure to high current or electrical energy levels, or to other risks.

- Never push objects of any kind into this product through slots or openings as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.

- Refer servicing to qualified service personnel.

- Use caution when installing and modifying telecommunications lines and never install telecommunication wiring during a lightning storm.

- Never install telecommunication jacks in wet locations unless the jack is specifically designed for wet locations.

- Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the network interface.

- Installation must include an independent frame ground conductor to building ground. Grounding/bonding circuit continuity is vital for safe operation of this equipment. Never operate with grounding/bonding conductor disconnected.

- This product has two -48 V DC input power feeders for each shelf. Disconnecting one power feeder will not de-energize the product. To reduce the risk of injury, disconnect the two power supply cables when removing power from the system.

- Metallic telecommunication interfaces should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection, as applicable.

- For continued protection against risk of fire, replace only with same type and rating of fuse.

- Use only Lucent Technologies manufactured, recognized circuit packs.

SAVE THESE INSTRUCTIONS.

Personal Safety Instructions (Continued)

Optical Laser Safety **READ AND UNDERSTAND ALL INSTRUCTIONS**

Lucent Technologies WaveStar™ digital transmission systems and associated optical test sets use semiconductor laser transmitters. The lasers emit lightwaves at or near infrared wavelengths into lightguide cables. This light is at the red end of the visible spectrum. Direct exposure at close distances should be avoided.

⚠ **WARNING:**
Never view any unterminated optical connector with optical instruments other than indirect image-converting devices. Directly viewing optics tends to focus the energy from an optical connector and, hence, increase the potential risk for injury.

Lasers and laser products are subject to federal and state regulations as well as Lucent Technologies laser safety requirements. The WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) systems use a Class I or Class IIIb laser as a transmitter. Under normal operation, the system is totally enclosed and fully protected by devices such that it presents no hazards to safety or health. Each system has been certified and registered with the National Center for Devices and Radiological Health (NCDRH) under the U.S. Food and Drug Administration (FDA) as a Class I system (exempt lasers and laser systems). All sections of the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) that can be removed and allow potential access to laser radiation have been identified. A warning label is provided on the rear of the shelf.

In addition, a compliance label stating that the system has been certified, along with the name and place of manufacture, is attached to each equipment bay. The compliance label is located on the rear of the equipment bays (at eye level, if possible). Several Cautions, Notices, and Danger Indications are also given on the rear label. Be sure to read and observe them. The text in these labels appears in both French and English.

SAVE THESE INSTRUCTIONS.

Equipment Safety Instructions

General Instructions

When using this telecommunication equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- Follow all warnings and instructions marked on the product.

- Slots and openings in this product at the back or bottom are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered.

- For continued protection against risk of fire, replace only with same type and rating of fuse.

- Use only Lucent Technologies manufactured, recognized circuit packs.

Electrostatic Discharge (ESD) Considerations

Observe the following precautions when handling circuit packs to prevent damage by electrostatic discharge:

⚠ **CAUTION:**
Industry experience has shown that all integrated circuit packs can be damaged by static electricity that builds up on work surfaces and personnel. The static charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

Equipment Safety Instructions (Continued)

Electrostatic Discharge (ESD) Considerations (Continued)

Observe the following precautions when handling circuit packs to prevent damage by electrostatic discharge:

- Assume all circuit packs and units contain solid state electronic components that can be damaged by ESD.

- Always wear a grounded wrist strap or wear a heel strap and stand on a grounded, static-dissipating, floor mat when handling circuit packs (storing, inserting, removing, etc.) or when working on the backplane.

- Handle all circuit packs by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.

- Observe warning labels on bags and cartons. Whenever possible, do not remove circuit packs from antistatic packaging until ready to insert them into slots.

- If possible, open all circuit packs at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats.

- Always store and transport circuit packs in static-safe packaging.

- Keep all static-generating materials such as food wrappers, plastics, and styrofoam containers away from all circuit packs.

- Maintain (whenever possible) relative humidity above the 20 percent level.

- Keep the electromagnetic interference (EMI)/ESD protective front covers installed at all times except during an upgrade or maintenance procedure. Once a circuit pack is replaced in the shelf, close the front cover.

To reduce the possibility of ESD damage, assemblies are equipped with grounding jacks to enable personnel to ground themselves using wrist straps while handling circuit packs or working on a shelf. These jacks are labeled "ESD". Wrist straps should be checked periodically with a wrist strap tester to ensure that they are working properly (1 MOhm Resistance).

Documents and Drawings

Combined WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Documents

The following documents provide additional information about the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) [combined 2.5G and 10G documents] for Release 4 and later:

- Number: 365-371-201

  Title: WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber), Applications and Planning Guide

  Audience: System planners and engineers

  Content: Features, applications, general description, system planning/engineering, and ordering information

- Number: 365-371-206

  Title: WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Installation Manual

  Audience: Installers

  Contents: Procedures and information needed to install the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) system

- Number: 365-371-207

  Title: WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber), Operations Systems Engineering Guide

  Audience: Engineers

  Contents: Operations systems (TL-1) engineering information for WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber)

- Number 365-371-210

  Title: WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber), User Operations Guide

  Audience: End user maintenance personnel

  Content: Detailed description, technical specifications, operations and maintenance, and user interface descriptive/tutorial information

- Number: 365-371-211

  Title: WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber), Alarm Messages and Trouble Clearing Guide

  Audience: End user maintenance personnel

  Content: Alarm message information and trouble clearing tasks

Documents and Drawings (Continued)

- Title: WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Software Release Description

  Audience: End user maintenance personnel

  Content: Status of problems fixed, known problems, and software installation procedure for the specific software release. This Lucent Technologies document is shipped with WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) software and is not orderable from the Lucent Technologies Customer Information Center.

- Number: 365-371-202

  WaveStar™ 2.5G/10G (OC-192) (2-Fiber) Software Ordering Guide

- Number: 065-215-200

  Bay Frame Application Planning Engineering Ordering Guide

- Number: 065-215-250

  Installation Guide for Seismic Network Bay Frame

WaveStar™ TDM 2.5G (OC-48) Documents

The following documents provide additional information about the WaveStar™ TDM 2.5G (OC-48) for Release 3 and earlier:

- Number: 365-371-101

  Title: WaveStar™ TDM 2.5G, Applications, Planning, and Ordering Guide.

  Audience: System planners and engineers

  Content: Features, applications, general description, system planning/engineering, and ordering information

- Number: 365-371-107

  Title: WaveStar™ TDM 2.5G, Operations Systems Engineering Guide

  Audience: Engineers

  Content: Operations systems (TL-1) engineering information for WaveStar™ TDM 2.5G

Documents and Drawings (Continued)

- Number: 365-371-110

  Title: WaveStar™ TDM 2.5G, User Operations Guide

  Audience: End user maintenance personnel

  Content: Detailed description, technical specifications, operations and maintenance, and user interface descriptive/tutorial information

- Number: 365-371-111

  Title: WaveStar™ TDM 2.5G, Alarm Messages and Trouble Clearing Guide

  Audience: End user maintenance personnel

  Content: Detailed description, technical specifications, operations and maintenance, and user interface descriptive/tutorial information

- Title: WaveStar™ TDM 2.5G, Software Release Description

  Audience: End user maintenance personnel

  Content: Status of problems fixed, known problems, and software installation procedure for the specific software release. This Lucent Technologies document is shipped with WaveStar™ TDM 2.5G (OC-48) software and is not orderable from the Lucent Technologies Customer Information Center.

WaveStar™ TDM 10G (OC-192) (2-Fiber) Documents

The following documents provide additional information about the WaveStar™ TDM 10G (OC-192) (2-Fiber) for Release 1:

- Number: 365-371-301

  Title: WaveStar™ TDM 10G (OC-192) (2-Fiber), Applications, Planning, and Ordering Guide

  Audience: System planners and engineers

  Content: Features, applications, general description, system planning/engineering, and ordering information

- Number: 365-371-307

  Title: WaveStar™ TDM 10G (OC-192), Operations Systems Engineering Guide

  Audience: Engineers

  Contents: Operations systems (TL-1) engineering information for WaveStar™ TDM 10G (OC-192)

Documents and Drawings (Continued)

WaveStar™ TDM 10G (OC-192) (2-Fiber) Documents (Continued)

- Number 365-371-310

  Title: WaveStar™ TDM 10G (OC-192) (2-Fiber), User Operations Guide

  Audience: End user maintenance personnel

  Content: Detailed description, technical specifications, operations and maintenance, and user interface descriptive/tutorial information

- Number: 365-371-311

  Title: WaveStar™ TDM 10G (OC-192) (2-Fiber), Alarm Messages and Trouble Clearing Guide

  Audience: End user maintenance personnel

  Content: Alarm message information and trouble clearing tasks

- Title: WaveStar™ TDM 10G (OC-192) (2-Fiber) Software Release Description

  Audience: End user maintenance personnel

  Content: Status of problems fixed, known problems, and software installation procedure for the specific software release. This Lucent Technologies document is shipped with WaveStar™ TDM 10G (OC-192) software and is not orderable from the Lucent Technologies Customer Information Center.

Combined Drawings for WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber)

The following drawings provide information for both the 2.5G and 10G systems:

- Number: ED9C280-31

  DS3/EC1 Connector Panel Kit for DS3/EC1 panels that mount to the right and left sides of 2.5G shelf

- Number: ED8C789-32

  WaveStar™ 2.5G/10G Specification for WaveStar™ 2.5G and 10G Circuit Pack Ordering

- Number: ED8C789-33

  WaveStar™ 2.5G Specification for WaveStar™ 2.5G Shelf Closing Details [Also applies to 10G]

- Number: ED8C789-34

  DS3/EC1 Connector Panel Kit for DS3/EC1 panels that mount in-bay above and below 2.5G shelf, and DS3/EC1 panels that mount to the rear of the 2.5G shelf

Documents and Drawings (Continued)

WaveStar™ TDM 2.5G (OC-48) Drawings

The following drawings provide additional information for the 2.5G system:

- Number: ED8C789-10

    WaveStar™ 2.5G Typical Bay Arrangement and Floor Plan Data Information

- Number: ED8C789-15

    Installers Cabling Plan for WaveStar™ 2.5G Shelf Assembly

- Number: ED8C789-28

    Cable Assembly Kit Required for Installation of ED8C789-30 Shelf Assembly

- Number: ED8C789-30

    Ordering and Installation Information for WaveStar™ 2.5G Shelf Assembly

- Number: ED8C789-40

    Specification for WaveStar™ 2.5G Software (for Release 2 or earlier)

- Number: ED8C789-41

    Specification for WaveStar™ 2.5G Software (for Release 3 or later)

Documents and Drawings (Continued)

WaveStar™ TDM 10G (OC-192) (2-Fiber) Drawings

The following drawings provide additional information for the 10G system:

- Number: ED8C789-16

  Installers Cabling Plan for a 10G System

- Number: ED8C789-21

  WaveStar™ 10G Cable Assemblies for ED8C789-31

- Number: ED8C789-29

  WaveStar™ 10G Cable Assembly Kits for ED8C789-31

- Number: ED8C789-31

  Ordering and Installation Information for WaveStar™ TDM 10G Shelf Assembly

- Number: ED8C789-27

  Formed Cables for WaveStar™ 10G

- Number: ED8C789-35

  Ordering and Installation Information for WaveStar™ TDM 10G Bay

- Number: ED8C789-41

  Specification for WaveStar™ 2.5G/10G Software (for 2.5G Release 3 and 10G Release 1 software; see 365-371-202 for later software releases)

Product Support

Purpose

This section describes the support services available to Lucent Technologies customers.

Lucent Technologies offers a number of services to assist customers with Engineering, Installation and Technical Support of their networks. Additionally, Lucent Technologies offers product specific training.

Worldwide Services

Lucent Worldwide Services provides a full life cycle of services and solutions to help you plan, design, implement, and operate your network in today's rapidly changing and complex environment.

Engineering Services

Engineering Services provide information and technical support to customers during the planning, implementation, and placement of equipment into new or existing networks. We determine the best, most economical equipment solution for a customer and help ensure equipment is configured correctly for the customer's network needs, works as specified, and is ready for installation on delivery. These services consist of the following:

- Equipment engineering
- Software engineering
- Site records
- Engineering consulting
- Additional engineering services (for example, Network Realignment, System Capacity Planning, System Health Assessment)

Installation Services

Lucent Technologies offers Installation Services focused on providing the technical support and resources customers need to efficiently and cost-effectively install their network equipment. We offer a variety of options that provide extensive support and deliver superior execution to help ensure the system hardware is installed, tested, and functioning as engineered and specified. Installation Services provides a complete flexible solution tailored to meet customers' specific needs. These services consist of the following:

- Equipment installation
- Specialized equipment installation
- Network connectivity services
- Installation support services

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- **Lucent OnLine Customer Support** - online access to information and services that can help resolve technical support requests.

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1. Click on "Browse the Catalog"
2. Click on "Worldwide Services Solutions"
3. Select the desired service to display
- Engineering services
- Installation services
- Technical Support Services

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  - Call: *1-888-LUCENT8 (582-3688): Prompt 2*.
- Outside the continental United States, either

•Visit *https://www.lucent-product-training.com*

•Contact your in-country training representative

•Call: +1-407-767-2798

•Fax: +1-407-767-2677

Suit casing

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   •Fax: +1-407-767-2677

Part IA: 2.5G/10G (2-Fiber) Physical and Power Installation

Physical and Power Installation Introduction

This part of the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Installation Manual and System Turn-up Services contains the physical installation of the bays/shelves, running all intra-bay cabling, running power cables, grounding the bay/shelf, running external timing cabling, running of alarm cabling, and running any communication link cables.

Contents

This part of the document contains the following chapters.

Physical and Power Installation Entry Checklist

Entry Checklist The following provides a checklist to be completed prior to perform the physical and power installation Verify that each procedure has been completed. Check off and initial the item.

Completed	Initials	Procedure	Notes
		Is the selected installation site accessible for delivery of bays? If on a different level than receiving dock, is the elevator large enough?	
		Adequate space for lineup shown.	
		Adequate depth for equipment (1'-6"), wiring aisle behind (2'-2") and maintenance aisle in front (2'-6") for a total of 6'-2"?	
		Enough space in cable rack or under floor to coil/loop excess length of transmission cables?	
		Enough space in cable rack or under floor for power and other external cables?	
		Are there any obstacles that will affect the physical installation or cabling?	
		Are the required fuse/breaker positions available?	
		Can they accommodate 6 gauge crimp lugs?	

Equipment Installation

2

Contents

Background

Introduction   This section provides information for installation of the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) systems and required heat baffles.

Objectives   This chapter provides information to perform the following:

1.   Install bay frames and associated accessories, except closing details.

2.   Install WaveStar™ TDM 2.5G Shelves.

3.   Install WaveStar™ TDM 10G Shelves.

4.   Install heat baffles.

5.   Install DS3/EC1 connector panels.

6.   Install closing details (except covers, to allow for cable installation).

Equipment Installation Information

Planning

The WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) systems are recommended to be mounted in seismic network bay frames. The ED-8C800-50 seismic network bay frames are designed for use in all earthquake zones and, in general, do not require top support at the 7-foot level.

Uncrating and Hauling

Please note the following precautions when uncrating equipment.

— Do NOT ship or store containers in any position other than its marked position.

— Move containers in the shipping position only. Verify that containers have not been damaged. It is important that all containers be handled with care and that no units are dropped.

— Uncrate all materials in quarters separate from the equipment room so as to keep dust and lint away from other equipment.

— Uncrate the shelf in its shipping position.

— Exercise care when uncrating shelves so that the equipment is not damaged.

— Two people are required to move the shelf. Move the shelf by lifting from the bottom of the shelf. Do NOT use the opening on the top of the shelf.

Equipment Installation Information (Continued)

Bay Frame and Shelf Mounting

WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelves mount into standard seismic network bay frames. Refer to ED8C789-10 and Figure 2-1 for information to install bay frames, spacers, fiber ducts, closing details, etc.

IMPORTANT NOTES:

1. Prior to mounting the bay frame to the floor:
   a. attach filler panel (C848416004) to top front of bay frame,
   b. attach four support brackets (C848219317) to the side, top, and bottom of bay frame,
   c. attach two 2 1/2" x 15" base fillers per ED8C806-50, G28 to side base of bay frame,
   d. attach two fiber ducts (C848119291) to sides of bay frame.

2. Mount bay frames to the floor such that the narrower shelf mounting flanges are facing the maintenance aisle (front of equipment), rather than the wiring aisle (equipment backplane).

3. If ED9C280-31 DS3/EC1 front-access vertically-mounted panels are used (these are the DS3/EC1 panels which mount on the left and right sides of the 2.5G shelf), the bays must be separated by 2.5-inch spacers on each side of the network bay frames.

⟹ **NOTE:**
If ED8C789-34 G1 & G2 in-bay horizontally-mounted DS3/EC1 panels are used (those that mount above and below the 2.5G shelf) **or** ED8C789-34 G10 & G11 rear-access vertically-mounted DS3/EC1 panels are used (those that mount on the backplane side of the 2.5G shelf), bay spacers are not required.

4. Connect a ground cable between each bay frame and building ground. The ground connection on the bay frame is usually at the top of the frame on the backplane side. The connection should be free of paint and other non-conductive coatings.

5. Closing detail support brackets, end guards, etc. are not installed until after:

   a. all shelves have been mounted,

   b. all DS3 panels have been installed.

6. Closing detail covers and doors are not installed until after:

   a. all cables have been installed and secured, and

   b. all testing is complete.

Equipment Installation Information (Continued)

Bay Frame Line-up Information

The figure depicts the top view of the bay frame line-up if vertically-mounted front-access DS3/EC1 panels are used. (These are the DS3/EC1 panels that mount on the left and right sides of the 2.5G shelf.) If in-bay horizontally-mounted DS3/EC1 panels are used (those that mount above and below the 2.5G shelf) or rear-access vertically-mounted DS3/EC1 panels are used (those that mount on the backplane side of the 2.5G shelf), the spacers are not required.

NC10G030
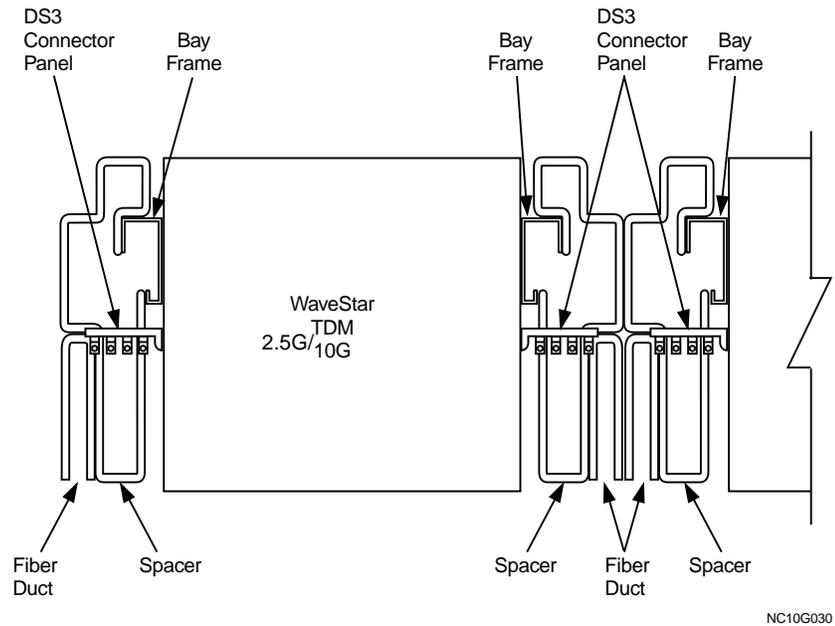
Figure 2-1.   **Top view of bay with spacers for DS3/EC1 panels. Refer to ED8C789-10 for additional installation information.**

Standalone 2.5G Equipment Installation

Description

The following information describes how to install standalone WaveStar™ 2.5G shelves. This procedure will be used whether there is one, two, or three shelves in a network bay frame. To install a 2.5G shelf as part of a 10G system, refer to the "10G Equipment Installation" Section.

Multiple 2.5G Shelves

Normally, the first WaveStar™ 2.5G shelf in a bay frame is mounted in the bottom position. The second shelf is then mounted in the middle position, and the third shelf is mounted at the top of the bay frame. However, if the 2.5G shelf will be upgraded to a 10G system in the future, it is recommended that the 2.5G shelf be mounted in the middle bay position with no 2.5G shelves above or below it. This allows the 10G shelf to be added above the 2.5G shelf, and a second 2.5G shelf to be added in the bottom bay position as part of the 10G system.

⇒ **NOTE:**
If two standalone WaveStar™ 2.5G shelves are mounted in a bay frame, only one of these shelves can be upgraded to a 10G system without affecting service.

DS3/EC1 Connector Panel Options

Depending on the location of the DS3/EC1 connector panels there are three options for mounting the WaveStar™ TDM 2.5G shelves (also refer to next section "Shelf Locations for 2.5G Shelves in a Bay Frame".

Option 1 (front-access vertically-mounted DS3/EC1 panels) - Up to three WaveStar® TDM 2.5G shelves fit into a bay with DS3/EC1 panels mounted on one or both sides of the shelves. Shelf locations for the 2.5G shelves and heat baffles are provided in **Table 2-1** and **Figure 2-2**. The installation procedure is provided in **Table 2-3**.

Option 2 (in-bay horizontally-mounted DS3/EC1 panels) - Up to two WaveStar™ TDM 2.5G shelves fit into a bay with DS3/EC1 panels mounted above and/or below the shelves. Shelf locations for the 2.5G shelves, DS3/EC1 panels, and heat baffles are provide in **Table 2-2** and **Figure 2-3**. The installation procedure is provided in **Table 2-4**.

Option 3 (rear-access vertically-mounted DS3/EC1 panels) - Up to three WaveStar™ TDM 2.5G shelves fit into a bay with DS3/EC1 panels mounted on one or both sides of the backplane side of the shelves. Shelf locations for the 2.5G shelves and heat baffles are provided in **Table 2-1**. The installation procedure is provided in **Table 2-3**.

Standalone 2.5G Equipment Installation (Continued)

Shelf Locations for 2.5G Shelves in a Bay Frame

Table 2-1. For 2.5G bays with either front-access or rear-access vertically-mounted DS3/EC1 panels (mounted to left and right sides or rear of 2.5G shelves) or <u>no</u> DS3/EC1 panels, shelf locations are as follows: [Refer to Figure 2-2 and Table 2-3 for installation instructions.]:

Item to Install	Bay Mounting Position (Install from bottom up.)
DS3/EC1 panel(s)	Right and/or left sides of 2.5G shelf (front-access or rear-access)
Third 2.5G Shelf	Directly above second heat baffle
Second Heat Baffle	Directly above second 2.5G
Second 2.5G Shelf	Directly above second heat baffle
Second Heat Baffle	Directly above first 2.5G
First 2.5G Shelf	Directly above first heat baffle
First Heat Baffle	Bottom of bay

Table 2-2. For 2.5G bays with horizontally-mounted DS3/EC1 panels, shelf locations are as follows: [Refer to Figure 2-3 and Table 2-4 for installation instructions.]

Item to Install	Bay Mounting Position (Install from bottom up.)
Fourth DS3/EC1 panel (stamped TOP)	Directly above fourth heat baffle
Fourth Heat Baffle	Directly above second 2.5G shelf
Second 2.5G Shelf	Directly above third heat baffle
Third Heat Baffle	Directly above second DS3/EC1 panel
Third DS3/EC1 panel (stamped BOTTOM)	Directly above second DS3/EC1 panel
Second DS3/EC1 panel (stamped TOP)	Directly above second heat baffle
Second Heat Baffle	Directly above first 2.5G shelf
First 2.5G Shelf	Directly above first heat baffle
First Heat Baffle	Directly above first DS3/EC1 panel
First DS3/EC1 panel (stamped BOTTOM)	Bottom of bay

Standalone 2.5G Equipment Installation (Continued)

Standalone WaveStar™ TDM 2.5G Shelves with Vertical DS3/EC1 Panels

Figure 2-2 depicts the correct configuration for three WaveStar™ TDM 2.5G shelves, required heat baffles, and front-access vertically-mounted DS3/EC1 panels.

DS3/EC1 panel

2.5G shelf

Heat Baffle

DS3/EC1 panel

2.5G shelf

Heat Baffle

DS3/EC1 panel

2.5G shelf
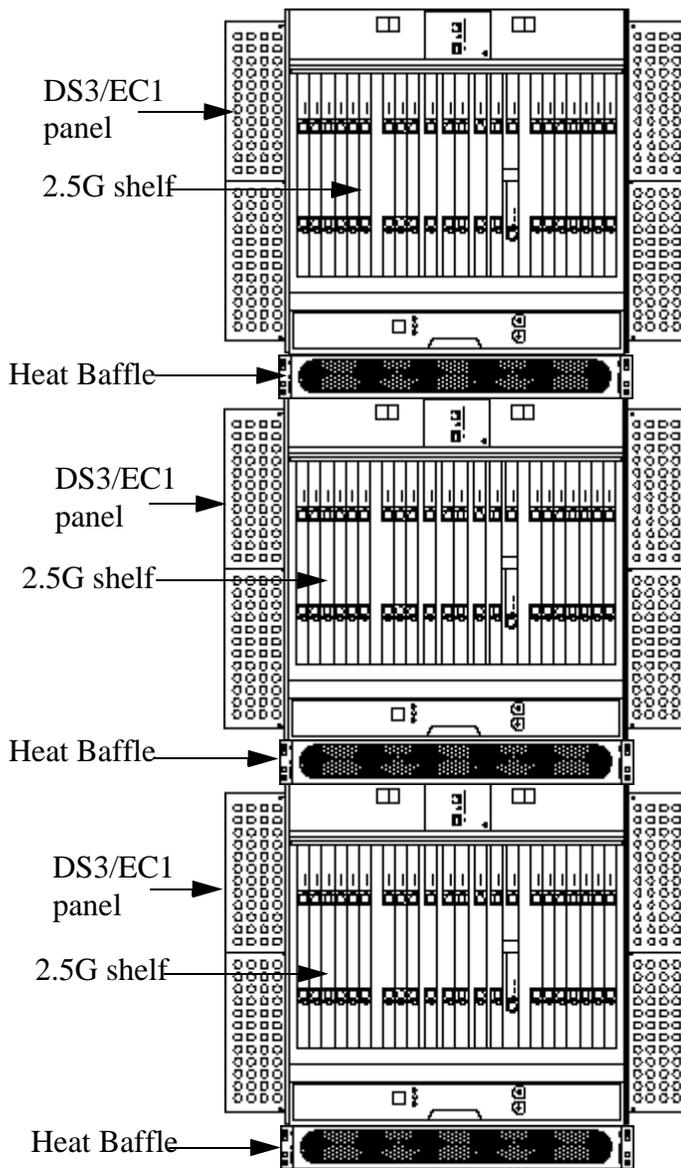
Heat Baffle

Figure 2-2.   Three WaveStar™ TDM 2.5G shelves, required heat baffles, and front-access vertically-mounted DS3/EC1 panels.

Standalone 2.5G Equipment Installation (Continued)

Installing 2.5G Shelves with Front-access or Rear-access Vertically-mounted DS3/EC1 Panels

Table 2-3. Use the following procedure to install WaveStar™ TDM 2.5G standalone shelves with front-access or rear-access vertically-mounted DS3/EC1 panels (or no DS3/EC1 panels).

Step	Action	
1	Using a volt/ohm meter verify the frame is properly grounded. **Requirement:** The resistance should read less than 1 Ohm.	
2	**If the frame is...**	**then**
	properly grounded,	proceed to Step 3.
	not properly grounded,	check and correct ground connection between frame and office ground.
3	Mount a heat baffle in the first mounting position of the bay frame (refer to Figure 2-2 and Figure 2-8). Heat baffles should be mounted with the screen in the front (such that the panel slopes **up** from the front of the equipment to the back). Use the screws supplied with the heat baffle to secure the heat baffle into place.	
4	If attached, remove the front and rear doors of each WaveStar™ TDM 2.5G shelf. Also, the fan unit in each shelf can be removed to make the shelf less heavy.	
5	Mount the WaveStar™ TDM 2.5G shelf directly above the heat baffle in the bay frame by sliding the shelf in from the front of the bay frame. Guidepins can be used to temporarily support the shelf. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.	
6	Mount a heat baffle directly on top of the WaveStar™ TDM 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.	
7	**If there are...**	**then**
	no more shelves,	proceed to Step 12.
	additional shelves,	proceed to Step 8.
		Continued on next page

Step	Action
8	Mount a WaveStar™ TDM 2.5G shelf directly on top of the heat baffle. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
9	Mount a heat baffle directly on top of the WaveStar™ TDM 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.

Step	If there are...	then
10	no more shelves,	proceed to Step 12.
	additional shelves,	proceed to Step 11.

Step	Action
11	Mount a WaveStar™ TDM 2.5G shelf directly on top of the heat baffle. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
12	On the rear of each 2.5G shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).
13	Re-insert the fan units, if previously removed.
14	Determine from office records which 2.5G shelves will require DS3/EC1 connector panels.
15	Install DS3/EC1 connector panels. Refer to either Table 2-9, "Front-Access Vertical DS3/EC1 Connector Panels" or Table 2-10, "Rear-Access Vertical DS3/EC1 Connector Panels" at the end of this chapter.
16	Continue with Cable Installation, Chapter 3.
17	**Stop! End of Task.**

Standalone 2.5G Equipment Installation (Continued)

2.5G Shelves with In-bay Horizontally-mounted DS3/EC1 Panels

Figure 2-3 depicts two WaveStar™ TDM 2.5G shelves, required heat baffles, and in-bay horizontally-mounted DS3/EC1 panels.

DS3/EC1 panel

Heat Baffle

2.5G Shelf

Heat Baffle

DS3/EC1 panel

DS3/EC1 panel

Heat Baffle

2.5G Shelf

Heat Baffle
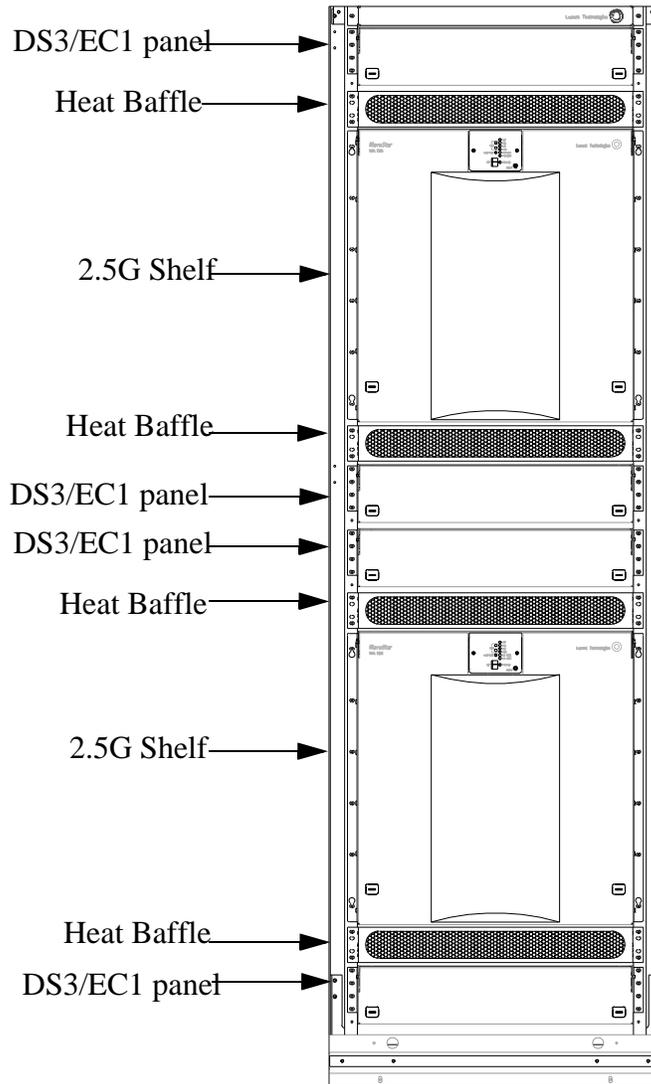
DS3/EC1 panel

Figure 2-3.   Two WaveStar™ TDM 2.5G shelves, required heat baffle (shaded), and in-bay horizontally-mounted DS3/EC1 panels.

Standalone 2.5G Equipment Installation (Continued)

Installing 2.5G Shelves with In-bay Horizontally-mounted DS3/EC1 Panels

Table 2-4. The following procedure describes how to install a WaveStar™ TDM 2.5G shelf with in-bay horizontally-mounted DS3/EC1 panels.

Step	Action	
1	Using a volt/ohm meter verify the frame is properly grounded. **Requirement:** The resistance should read less than 1 Ohm.	
2	**If the frame is...**	**then**
	properly grounded,	proceed to Step 3.
	not properly grounded,	check and correct ground connection between frame and office ground.
3	**If...**	**then**
	using DS3/EC1 port units in slots 1-6 of the first 2.5G shelf,	mount the DS3/EC1 panel in the bottom of the bay frame. This panel is stamped "BOTTOM" on one side of the panel, just above the cable opening.
	not using a DS3/EC1 panel for the left side of shelf, slots 1-6 of the first shelf,	leave a 5 inch space in the bottom of the bay frame.
4	Mount a heat baffle above the DS3/EC1 panel or 5-inch space (refer to Figure 2-3). Heat baffles should be mounted with the screen in the front (such that the panel slopes **up** from the front of the equipment to the back). Use the screws supplied with the heat baffle to secure the heat baffle into place.	
5	Remove the front and rear doors of each WaveStar™ TDM 2.5G shelf. Also, the fan units in each shelf can be removed to make the shelf less heavy.	
6	Mount the WaveStar™ TDM 2.5G shelf directly above the heat baffle in the bay frame by sliding the shelf in from the front of the bay frame. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.	
	Continued on next page	

Step	Action
7	On the rear of the shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).
8	Mount a heat baffle directly on top of the WaveStar™ TDM 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.

Step	If...	then
9	using a DS3/EC1 panel for the right side of the first 2.5G shelf, slots 11-16,	mount the DS3/EC1 panel directly above the heat baffle. This panel is stamped "TOP" on one side of the panel above the opening for cables.
	not using a DS3/EC1 panel for right side of the shelf, slots 11-16,	leave a 5 inch space directly above the heat baffle.

Step	If there are...	then
10	no more shelves,	**Stop! End of Task.**
	additional shelves,	proceed to Step 11.

Step	If...	then
11	using a DS3/EC1 panel for left side of the second 2.5G shelf, slots 1-6 (note that this panel is stamped "BOTTOM"),	mount a DS3/EC1 panel directly above the previously installed DS3/EC1 panel or 5-inch space.
	not using a DS3/EC1 panel for left side of the shelf, slots 1-6	leave a 5 inch space directly above the heat baffle.

Step	Action
12	Mount a heat baffle directly on top of the DS3/EC1 panel or 5-inch space.
13	Mount a WaveStar™ TDM 2.5G shelf directly on top of the heat baffle. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
14	On the rear of the shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).
15	Mount a heat baffle directly on top of the WaveStar™ TDM 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.

Continued on next page

Step	Action	
16	**If...**	**then**
	using a DS3/EC1 panel for right side of the second 2.5G shelf, slots 11-16 (note that this panel is stamped "TOP"),	mount a DS3/EC1 panel directly above the heat baffle.
	not using a DS3/EC1 panel for right side of the shelf, slots 11-16,	leave a 5 inch space directly above the heat baffle.
17	Continue with Cable Installation, Chapter 3.	
18	**Stop! End of Task.**	

10G Equipment Installation

Description   The following information describes how to install the WaveStar™ TDM 10G (OC-192) (2-Fiber) system, which consists of one 10G shelf and up to four 2.5G shelves. This procedure will be used whether there are one, or two 2.5G shelves in a network bay frame, and if there is up to four 2.5G shelves to be added.

For the remainder of this document, the shelves will be identified as follows:

- **10G shelf** is the shelf in the top-most bay position which can be identified by the 10G label on the right side panel.

- **First 2.5G shelf** is the shelf in the middle bay position which can be identified by the 2.5G label on the right side panel. This 2.5G shelf is also referred to as the main I/O shelf, main controller shelf or main tributary shelf.

- **Second 2.5G shelf** is the shelf in the bottom bay position.

- **Third 2.5G shelf** is the third expansion shelf.

- **Fourth 2.5G shelf** is the fourth expansion shelf.

Multiple 2.5G Shelves in 10G System   Depending on the location of the DS3/EC1 connector panels there are three options for physically mounting the WaveStar™ TDM 2.5G shelves in a 10G system (also refer to next section "Shelf Locations for 10G and 2.5G Shelves".

Option 1 (front-access vertically-mounted DS3/EC1 panels) - One 10G shelf and up to two 2.5G shelves fit into a 10G bay with DS3/EC1 panels mounted on one or both sides of the shelves. The third and fourth 2.5G Shelves are mounted in an adjacent bay. Locations of 2.5G and 10G shelves and heat baffles are provided in **Table 2-5** and **Figure 2-5**. The installation procedure is provided in **Table 2-7**.

Option 2 (in-bay horizontally-mounted DS3/EC1 panels) - One WaveStar™ TDM 2.5G shelf fits into a 10G bay with DS3/EC1 panels mounted above and/or below the shelf. The second and third expansion shelves are located in an adjacent bay, and the fourth 2.5G shelf is located in a second additional bay. Locations of 2.5G and 10G shelves and heat baffles are provided in **Table 2-6** and **Figure 2-6**. The installation procedure is provided in **Table 2-8**.

Option 3 (rear-access vertically-mounted DS3/EC1 panels) - One 10G shelf and up to two 2.5G shelves fit into a bay with DS3/EC1 panels mounted on one or both sides of the rear of the shelves. The third and fourth 2.5G Shelves are mounted in an adjacent bay. Locations of 2.5G and 10G shelves and heat baffles are provided in **Table 2-5**. The installation procedure is provided in **Table 2-7**.

10G Equipment Installation (Continued)

Shelf Locations for 10G and 2.5G Shelves

For systems with **either front-access or rear-access vertically-mounted** DS3/EC1 panels (mounted to left and right sides or rear of 2.5G shelves) or <u>no</u> DS3/EC1 panels, shelf locations are as follows: [Refer to Figure 2-5]:

Table 2-5.	Bay With One 10G Shelf and Up to Two 2.5G Shelves and Bay with up to two 2.5G expansion shelves and Vertically-Mounted Front or Rear-Access DS3/EC1 Panels (Install from Top down.)
Item to Install	**Bay Mounting Position**
10G Shelf	Top of bay
Heat Baffle	Directly below 10G
First 2.5G Shelf	Directly below heat baffle
Heat Baffle	Directly below first 2.5G
Second 2.5G Shelf	Directly below heat baffle
Heat Baffle	Directly below second 2.5G
DS3/EC1 panel(s)	Right and/or left sides of 2.5G shelves (front-access or rear-access)
Fourth 2.5G Shelf	Top of second bay
Heat Baffle	Directly below Third 2.5G Shelf
Third 2.5G Shelf	Directly below heat baffle
Heat Baffle	Directly below Third 2.5G

**Shelf Positions for
10G System with
Vertically-mounted
DS3/EC1 Panels**

10G Bay 1 shelf 2	4th 2.5G Bay 2 shelf 2
Main 2.5G Bay 1 shelf 1	3rd 2.5G Bay 2 shelf 1
2nd 2.5G Bay 1 shelf 3	Vacant

Figure 2-4. **Shelf Positions for 10G shelf, four 2.5G shelves, vertically-mounted
DS3/EC1 connector panels, and heat baffles.**

10G Equipment Installation (Continued)

Shelf Locations for 10G and 2.5G Shelves (Continued)

For systems with **in-bay horizontally-mounted** DS3/EC1 panels (mounted within bay frame, above and below 2.5G shelf), shelf locations are as follows: [Refer to Figure 2-6]

Table 2-6. Bay With One 10G Shelf and One 2.5G Shelf and Horizontally-Mounted DS3/EC1 Panels (Normally installed from Top down.) and up to 2 additional bays with up to three expansion shelves.

Item to Install	Bay Mounting Position
10G Shelf	Top of bay 1
Heat Baffle	Directly below 10G
DS3/EC1 panel	Directly below heat baffle
Heat Baffle	Directly below first DS3/EC1 panel
2.5G Shelf	Directly below heat baffle
Heat Baffle	Directly below 2.5G
DS3/EC1 panel	Directly below heat baffle
DS3/EC1 panel	Top of bay 2
Heat Baffle	Directly below DS3/EC1 panel
2.5G Shelf	Directly below heat baffle
Heat Baffle	Directly below 2.5G
DS3/EC1 panel	Directly below heat baffle
DS3/EC1 panel	Directly below DS3/EC1 panel
Heat Baffle	Directly below DS3/EC1 panel
2.5G Shelf	Directly below heat baffle
Heat Baffle	Directly below 2.5G
DS3/EC1 panel	Directly below heat baffle

10G Equipment Installation (Continued)

10G System with Front-access Vertically-mounted DS3/EC1 Panels

Figure 2-5 depicts a bay equipped with a 10G shelf, two 2.5G shelves, front-access vertically-mounted DS3/EC1 connector panels, and heat baffles.
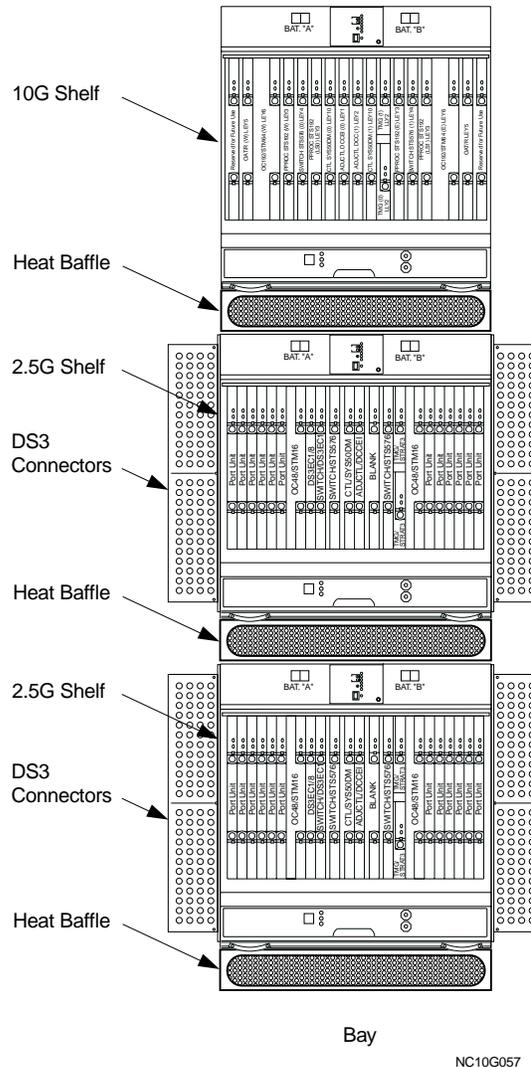
Figure 2-5. **10G shelf, two 2.5G shelves, front-access vertically-mounted DS3/EC1 connector panels, and heat baffles.**

10G Equipment Installation (Continued)

Installing 10G and 2.5G Shelves with Vertically-mounted DS3/EC1 Panels

Table 2-7. **The following procedure describes how to install the 10G and 2.5G shelves in a bay with front-access or rear-access <u>vertically-mounted</u> DS3/EC1 connector panels.**

Step	Action
1	Using a volt/ohm meter verify the frame is properly grounded. **Requirement:** The resistance should read less than 1 Ohm.
2	<table><tr><th>If the frame is:</th><th>then:</th></tr><tr><td>properly grounded,</td><td>proceed to Step 3.</td></tr><tr><td>not properly grounded,</td><td>check and correct ground connection between frame and office ground.</td></tr></table>
3	Remove the front and rear doors of each 10G and 2.5G shelf. Also, the fan units in each shelf can be removed to make the shelf less heavy.
4	Mount the 10G shelf in the top-most mounting position of the bay frame by sliding the shelf in from the front of the bay frame. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
5	Mount a heat baffle directly below the 10G shelf in the bay frame. Heat baffles should be mounted with the screen in the front (such that the panel slopes **up** from the front of the equipment to the back). Use the screws supplied with the heat baffle to secure the heat baffle into place.
6	Mount the first 2.5G shelf in the position directly below the heat baffle. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
7	Mount a heat baffle directly below the 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.
8	<table><tr><th>If there are:</th><th>then:</th></tr><tr><td>no more shelves,</td><td>proceed to Step 24.</td></tr><tr><td>additional shelves,</td><td>proceed to Step 9.</td></tr></table>
9	Mount a 2.5G shelf directly below the heat baffle. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
	Continued on next page

Step	Action
10	Mount a heat baffle directly below the lower 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place. Position of heat baffle is shown in Figure 2-8.
11	On the rear of the 2.5G shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U-shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).
12	Re-insert the fan units, if previously removed.
13	Determine from office records which 2.5G shelves will require DS3/EC1 connector panels.
14	Install vertically-mounted DS3/EC1 connector panels as needed. Refer to either Table 2-9, "Front-Access Vertical DS3/EC1 Connector Panels" or Table 2-10, "Rear-Access Vertical DS3/EC1 Connector Panels" at the end of this chapter.

Step		
15	**If there are:**	**then:**
	no more shelves,	proceed to Step 24.
	additional shelves,	proceed to Step 16.

Step	Action
16	Using a volt/ohm meter verify the second frame is properly grounded. **Requirement:** The resistance should read less than 1 Ohm.

Step		
17	**If the frame is:**	**then:**
	properly grounded,	proceed to Step 18.
	not properly grounded,	check and correct ground connection between frame and office ground.

Step	Action
18	Remove the front and rear doors of Third 2.5G shelf. Also, the fan units in each shelf can be removed to make the shelf less heavy.
19	Mount the Third 2.5G shelf in the top-most mounting position of the bay frame by sliding the shelf in from the front of the bay frame. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
20	Mount a heat baffle directly below the Third 2.5G shelf in the bay frame. Heat baffles should be mounted with the screen in the front (such that the panel slopes **up** from the front of the equipment to the back). Use the screws supplied with the heat baffle to secure the heat baffle into place.

Step		
21	**If there are:**	**then:**
	no more shelves,	proceed to Step 24.
	additional shelves,	proceed to Step 22.
		Continued on next page

Step	Action
22	Mount the Fourth 2.5G shelf in the position directly below the heat baffle. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
23	Mount a heat baffle directly below the Fourth 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.
24	On the rear of the 2.5G shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U-shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).
25	Re-insert the fan units, if previously removed.
26	Determine from office records which 2.5G shelves will require DS3/EC1 connector panels.
27	Install vertically-mounted DS3/EC1 connector panels as needed. Refer to either Table 2-9, "Front-Access Vertical DS3/EC1 Connector Panels" or Table 2-10, "Rear-Access Vertical DS3/EC1 Connector Panels" at the end of this chapter.
28	Continue with Cable Installation, Chapter 3.
29	**Stop! End of Task.**

10G Equipment Installation (Continued)

10G System with In-bay Horizontally-mounted DS3/EC1 Panels

Figure 2-6 depicts a bay equipped with a 10G shelf, one 2.5G shelf, in-bay horizontally-mounted DS3/EC1 connector panels, and heat baffles

NC10G035

Figure 2-6.   10G shelf, one 2.5G shelf, in-bay horizontally-mounted DS3/EC1 connector panels, and heat baffles.

10G Equipment Installation (Continued)

Installing 10G and 2.5G Shelves with In-bay Horizontally-mounted DS3/EC1 Panels

Table 2-8. **The following procedure describes how to install the 10G shelf and one 2.5G shelf in a bay with <u>horizontally-mounted</u> DS3/EC1 connector panels and additional 2.5G shelves in additional bay frames, if applicable.**

Step	Action
1	Using a volt/ohm meter verify the frame is properly grounded. **Requirement:** The resistance should read less than 1 Ohm.
2	<table><tr><td>**If the frame is:**</td><td>**then:**</td></tr><tr><td>properly grounded,</td><td>proceed to Step 3.</td></tr><tr><td>not properly grounded,</td><td>check and correct ground connection between frame and office ground.</td></tr></table>
3	Remove the front and rear doors of each 10G and 2.5G shelf. Also, the fan units in each shelf can be removed to make the shelf less heavy.
4	Mount the 10G shelf in the top-most mounting position of the bay frame by sliding the shelf in from the front of the bay frame. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
5	Mount a heat baffle directly below the 10G shelf in the bay frame. Heat baffles should be mounted with the screen in the front (such that the panel slopes **up** from the front of the equipment to the back). Use the screws supplied with the heat baffle to secure the heat baffle into place.
6	Determine from office records which DS3/EC1 connector panels are required. If a DS3/EC1 panel is needed for DS3/EC1 circuit packs in slots 11-16, mount a DS3/EC1 connector panel in the position directly below the heat baffle. Note that this panel is stamped "TOP". If no DS3/EC1 panel is required here, leave a 5-inch space below the heat baffle.
7	Mount another heat baffle directly below the DS3/EC1 panel, or the 5-inch space if there is no DS3/EC1 panel.
8	Mount the 2.5G shelf in the position directly below the heat baffle. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
	Continued on next page

Step	Action
9	Mount a heat baffle directly below the 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.
10	If a DS3/EC1 connector panel is needed for DS3/EC1 circuit packs in slots 1-6, mount the second DS3/EC1 panel in the position directly below the heat baffle. Note that this panel is stamped "BOTTOM".
11	On the rear of the 2.5G shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U-shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).

Step		
12	**If...**	**then**
	There is additional shelves,	proceed to Step 13.
	There are no additional shelves,	proceed to Step 36.

Step	Action
13	Using a volt/ohm meter verify the second frame is properly grounded. **Requirement:** The resistance should read less than 1 Ohm.

Step		
14	**If the frame is...**	**then**
	properly grounded,	proceed to Step 15.
	not properly grounded,	check and correct ground connection between frame and office ground.

Step		
15	**If...**	**then**
	using DS3/EC1 port units in slots 11-16 of the first 2.5G shelf,	mount the DS3/EC1 panel in the bottom of the bay frame. This panel is stamped "TOP" on one side of the panel, just above the cable opening.
	not using a DS3/EC1 panel for the left side of shelf, slots 1-6,	leave a 5 inch space in the bottom of the bay frame.

Step	Action
16	Mount a heat baffle above the DS3/EC1 panel or 5-inch space (refer to Figure 2-3). Heat baffles should be mounted with the screen in the front (such that the panel slopes **up** from the front of the equipment to the back). Use the screws supplied with the heat baffle to secure the heat baffle into place.
17	Remove the front and rear doors of each WaveStar™ TDM 2.5G shelf. Also, the fan units in each shelf can be removed to make the shelf less heavy.
18	Mount the Second WaveStar™ TDM 2.5G shelf directly above the heat baffle in the bay frame by sliding the shelf in from the front of the bay frame. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.
	Continued on next page

Step	Action	
19	On the rear of the shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).	
20	Mount a heat baffle directly on top of the WaveStar™ TDM 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.	
21	**If...**	**then**
	using a DS3/EC1 panel for the left side of the first 2.5G shelf, slots 1-6,	mount the DS3/EC1 panel directly above the heat baffle. This panel is stamped "BOTTOM" on one side of the panel above the opening for cables.
	not using a DS3/EC1 panel for right side of the shelf, slots 11-16,	leave a 5 inch space directly above the heat baffle.
22	**If there are...**	**then**
	no more shelves,	**Stop! End of Task.**
	additional shelves,	proceed to Step 23.
23	There is now need for an second bay, the additional shelves will be mounted in the second bay frame.	
24	**If...**	**then**
	using a DS3/EC1 panel for right side of the second 2.5G shelf, slots 11-16 (note that this panel is stamped "TOP"),	mount a DS3/EC1 panel directly above the previously installed DS3/EC1 panel or 5-inch space.
	not using a DS3/EC1 panel for left side of the shelf, slots 1-6	leave a 5 inch space directly above the heat baffle.
25	Mount a heat baffle directly on top of the DS3/EC1 panel or 5-inch space.	
26	Mount the Third WaveStar™ TDM 2.5G shelf directly on top of the heat baffle. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.	
27	On the rear of the shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).	
28	Mount a heat baffle directly on top of the WaveStar™ TDM 2.5G shelf. Use the screws supplied with the heat baffle to secure the heat baffle into place.	
	Continued on next page	

Step	Action	
29	**If...**	**then**
	using a DS3/EC1 panel for left side of the second 2.5G shelf, slots 1-6,(note that this panel is stamped "BOTTOM"),	mount a DS3/EC1 panel directly above the heat baffle.
	not using a DS3/EC1 panel for right side of the shelf, slots 11-16,	leave a 5 inch space directly above the heat baffle.
30	**If there are...**	**then**
	no more shelves,	**Stop! End of Task.**
	additional shelves,	proceed to Step 30.
31	Using a volt/ohm meter verify the second frame is properly grounded. **Requirement:** The resistance should read less than 1 Ohm.	
32	**If the frame is...**	**then**
	properly grounded,	proceed to Step 32.
	not properly grounded,	check and correct ground connection between frame and office ground.
33	**If...**	**then**
	using DS3/EC1 port units in slots 11-16 of the first 2.5G shelf,	mount the DS3/EC1 panel in the bottom of the bay frame. This panel is stamped "TOP" on one side of the panel, just above the cable opening.
	not using a DS3/EC1 panel for the left side of shelf,	leave a 5 inch space in the bottom of the bay frame.
34	Mount a heat baffle above the DS3/EC1 panel or 5-inch space (refer to Figure 2-3). Heat baffles should be mounted with the screen in the front (such that the panel slopes **up** from the front of the equipment to the back). Use the screws supplied with the heat baffle to secure the heat baffle into place.	
35	Remove the front and rear doors of each WaveStar™ TDM 2.5G shelf. Also, the fan units in each shelf can be removed to make the shelf less heavy.	
36	Mount the Fourth WaveStar™ TDM 2.5G shelf directly above the heat baffle in the bay frame by sliding the shelf in from the front of the bay frame. Use the thread-cutting screws provided with the installation kit to mount the shelf to ensure a good ground connection from the bay to the shelf.	
	Continued on next page	

Step	Action
37	On the rear of the shelf, install the plastic molded edge trim that is shipped with the shelf. The edge trim is to be installed in the two U shaped cutouts on each side of the shelf (refer to Figure 2-7 for proper placement).
38	Continue with Cable Installation, Chapter 3.
39	**Stop! End of Task.**

2.5G/10G Equipment Installation

**Edge Trim
Placement**
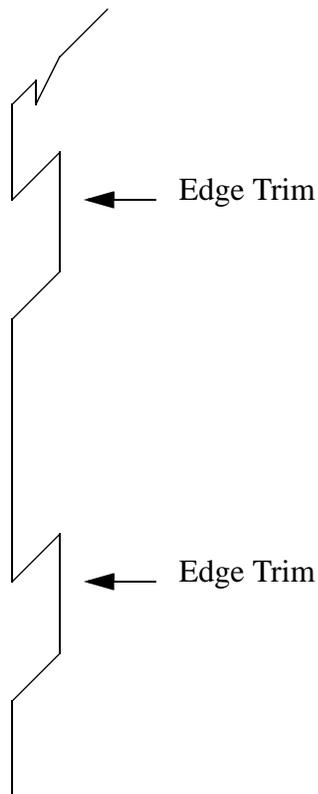
**Figure 2-7.   The figure above displays the proper placement of the edge trim at the
back of the 2.5G shelf.**

2.5G/10G Equipment Installation (Continued)

Heat Baffle Mounting Position

Figure 2-8.   The figure above illustrates the proper mounting location for the heat baffle in the bottom bay position, when either no DS3/EC1 panels or vertical DS3/EC1 panels are used.

Front-Access Vertical DS3/EC1 Connector Panels

Background

DS3/EC1 connector panels are required for DS3/EC1 low-speed connections. The panels allow for 48 inputs and 48 outputs per panel. One panel is required for port slots 1 - 6 and one is required for port slots 11-16. The procedure for front-access vertically-mounted DS3/EC1 panels is below.

Installing Front-access Vertical DS3/EC1 Panels

Table 2-9. **The following procedure describes how to install front-access vertically-mounted DS3/EC1 connector panels on a WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelf.**

⇒ **NOTE:**
If installing front-access vertically-mounted DS3/EC1 panels in the bottom bay position, make sure the closing detail side brackets are not yet installed as they will prevent access to the bottom screw of the DS3/EC1 panel.

Step	Action	
1	**If using DS3/EC1 port units...**	**then...**
	in slots 1 - 6	Insert six screws into the screw holes on the left side of the 2.5G shelf (as viewed from front of equipment). Do not tighten screws. Refer to Figure 2-9.
		Slide the DS3/EC1 connector panels over the screws and hold in place while tightening the screws.
	in slots 11 - 16	Insert six screws into the screw holes on the right side of the 2.5G shelf (as viewed from front of equipment). Do not tighten screws. Refer to Figure 2-9.
		Slide the DS3/EC1 connector panels over the screws and hold in place while tightening the screws.
2	Once all DS3/EC1 panels are installed, continue with Cable Installation, Chapter 3.	
3	**Stop! End of Task.**	

Front-Access Vertical DS3/EC1
Connector Panels (Continued)

**Installing Front-
Access Vertical DS3
Panel**

Figure 2-9. The figure above illustrates the proper mounting location for the front-access vertically-mounted DS3 panel on the left side of the 2.5G shelf. The right-side panel is a mirror image of this view.

Tie Bar Installation

Tie Bar Installation Each vertically-mounted, front-access DS3 panel kit includes a tie bar. The tie bar is not needed for most cabling applications. However, if the tie bar is used, it is mounted in front of the DS3 panel on the bay frame approximately 2 3/8 inches above and below the DS3 panel, if possible. If there is existing equipment mounted in either bay position (e.g. a heat baffle), the tie bar can be mounted in front of the existing equipment, but it may be necessary to replace the existing mounting screw with a slightly longer screw to accommodate the combined depth of both the existing equipment and the tie bar. Refer to Figure 2-10.

Installing the Tie Bar for the Front-Access Vertical DS3 Panel

Tie Bar →

Figure 2-10.   **The figure above illustrates the proper mounting location for the cable tie bar for the front-access vertically-mounted DS3 panel on the left side of the 2.5G shelf. The right-side panel is a mirror image of this view.**

Rear-Access Vertical DS3/EC1 Connector Panels

Background   DS3/EC1 connector panels are required for DS3/EC1 low-speed connections. The panels allow for 48 inputs and 48 outputs per panel. One panel is required for port slots 1 - 6 and one is required for port slots 11-16. There are two options for the panels. They can be mounted vertically or horizontally. The procedure for rear-access vertically-mounted DS3/EC1 panels is below.

Installing Rear-access Vertical DS3/EC1 Panels

Table 2-10.   The following procedure describes how to install rear-access vertically-mounted DS3/EC1 connector panels on a WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelf.

Step	Action	
1	**If using DS3/EC1 port units...**	**then...**
	in slots 1 - 6	Insert six screws into the screw holes on the rear of the left side panel of the 2.5G shelf bay uprights (as viewed from front of equipment). Do not tighten screws.
		Slide the DS3/EC1 connector panels over the screws and hold in place while tightening the screws.
	in slots 11 - 16	Insert six screws into the screw holes on the rear of the right side panel of the 2.5G shelf bay uprights (as viewed from front of equipment). Do not tighten screws.
		Slide the DS3/EC1 connector panels over the screws and hold in place while tightening the screws.
2	Once all DS3/EC1 panels are installed, continue with Cable Installation, Chapter 3.	
3	**Stop! End of Task.**	

Final Operations

After all shelves and DS3 panels have been installed, install the bay frame closing details per ED8C789-33. Leave the covers off for cable installation. After the appropriate closing details have been installed, continue with the next chapter, Cable Installation.

Cable Installation

3

Contents

Background

Introduction   This section provides information to install cables for the WaveStar™ TDM 2.5G (OC-48)
                        Standalone and the WaveStar™ 10G (OC-192) (2-Fiber) system.

Objectives   This chapter provides information to install the 2.5G and 10G cables. Install the following
                        cables in the sequence listed below:

1. Install electrical cables

    a. Interconnecting cables between 2.5G and/or 10G shelves

    b. Power cables

    c. Timing cables

    d. Office Alarms cables

    e. Miscellaneous Discrete cables

    f. LAN cables

    g. DS3/EC1 cables

2. Install optical fiber cables

Required   During cable installation, refer to ED8C789-15 (Issue 2 or later) Installers Cabling Plan
Documentation   for WaveStar™ 2.5G Shelf Assembly, and ED8C789-16 (Issue 5 or later) Installers
                        Cabling Plan for a 10G Bay System, for backplane connector locations, cable routing
                        diagrams, and other required cabling information.

Backplane Cables for Interconnection of 10G and 2.5G Shelves in 10G System

Background

The backplane cables listed in the tables below interconnect the 10G and 2.5G shelves. In some configurations, these cables have already been factory-installed. If so, or if you are installing a 2.5G standalone shelf, skip this section and proceed to the next section, "Power Cables".

The interconnection cables to connect the 10G shelves to the 2.5G shelves connect the can be different depending on the applications to be used. The first shelf and fourth shelf always connect to the same place, this will be referred to as Pproc Port A and Pproc Port D respectively. This are not physical connection labels, but will be used for reference. Shelves 2 and 3 will be connected differently depending on the application. These two shelves will use Pproc Ports B and C. The following table lists which shelf will use which port depending on the application.

Cabling Options

Table 3-1.   Option 1

Option 1 is to be used when:

- STS576 cards are used in the 10G shelf
- If OC-192 UPSR may be used.

Shelf	Pproc Port
Shelf 1	Pproc Port A
Shelf 2	Pproc Port B
Shelf 3	Pproc Port C
Shelf 4	Pproc Port D

Table 3-2.   Option 2

Option 2 will be used for all other applications.

Shelf	Pproc Port
Shelf 1	Pproc Port A
Shelf 2	Pproc Port C
Shelf 3	Pproc Port B
Shelf 4	Pproc Port D

Pproc Port A: Interconnection Cables for 10G to First 2.5G Shelf (Main I/O Shelf)

Table 3-3.   Pproc Port A: Required backplane cables and associated labels to connect the 10G shelf to the first 2.5G shelf (main I/O shelf)

ED8C789-21	Label for 10G end of cable	Label for first 2.5G end of cable
GR20	J7	J409
GR20	J8	J405
GR20	J9	J492
GR20	J10	J494
GR30	J5	J397
GR30	J6	J398
GR10	J12	J510
GR10	J16	J516
GR10	J36	J498
GR10	J40	J504
GR11*	J21	J512
GR11*	J25	J518
GR11*	J29	J500
GR11*	J33	J506

* The ED8C789-21 G11 cable assembly has different connectivity at each end. The end with the label reading "10G CONN" must be connected to the 10G shelf. (The other cables are symmetric, i.e. either end can be connected to either shelf.)

(Continued on next page)

Backplane Cables for Interconnection of 10G and 2.5G Shelves in 10G System (Continued)

Pproc Port B: Interconnection Cables for 10G to second 2.5G shelf or third 2.5G shelf.

Table 3-4. **Pproc Port B: Required backplane cables and associated labels to connect the 10G shelf to the second 2.5G shelf or third 2.5G shelf**

ED8C789-21	Label for 10G end of cable	Label for second or third 2.5G end of cable
GR10	J20	J512
GR10	J24	J518
GR10	J28	J500
GR10	J32	J506
GR11*	J13	J510
GR11*	J17	J516
GR11*	J37	J498
GR11*	J41	J504

* The ED8C789-21 G11 cable assembly has different connectivity on each end. A label reading "10G CONN" is on the end to be connected to the 10G shelf.

Backplane Cables for Interconnection of 10G and 2.5G Shelves in 10G System (Continued)

Pproc Port C: Interconnection Cables for 10G to third 2.5G Shelf or second 2.5G Shelf.

Table 3-5.   Pproc Port C: Required backplane cables and associated labels to connect the 10G shelf to the third 2.5G shelf of second 2.5G shelf)

ED8C789-21	Label for 10G end of cable	Label for third or second 2.5G end of cable
GR10	J14	J510
GR10	J18	J516
GR10	J38	J498
GR10	J42	J504
GR11*	J23	J512
GR11*	J27	J518
GR11*	J31	J500
GR11*	J35	J506

* The ED8C789-21 G11 cable assembly has different connectivity at each end. The end with the label reading "10G CONN" must be connected to the 10G shelf. (The other cables are symmetric, i.e. either end can be connected to either shelf.)

(Continued on next page)

Pproc Port D:
Interconnection
Cables for 10G to
Fourth 2.5G Shelf
(Main I/O Shelf)

Table 3-6.   Pproc Port D: Required backplane cables and associated labels to connect the 10G shelf to the fourth 2.5G shelf (main I/O shelf)

ED8C789-21	Label for 10G end of cable	Label for fourth 2.5G end of cable
GR10	J22	J512
GR10	J26	J518
GR10	J30	J500
GR10	J34	J506
GR11*	J15	J510
GR11*	J19	J516
GR11*	J39	J498
GR11*	J43	J504

* The ED8C789-21 G11 cable assembly has different connectivity at each end. The end with the label reading "10G CONN" must be connected to the 10G shelf. (The other cables are symmetric, i.e. either end can be connected to either shelf.)

Backplane Cables for Interconnection of 10G and 2.5G Shelves in 10G System (Continued)

Interconnection Cables for first 2.5G shelf to second 2.5G shelf

Table 3-7.   Required backplane cables and associated labels to connect the first 2.5G shelf (main I/O shelf) to the second 2.5G shelf

ED8C789-21	Label for first 2.5G end of cable	Label for second 2.5G end of cable
GR20	J406	J491
GR20	J410	J490
GR20	J493	J496
GR20	J495	J497
GR30	J399	J395
GR30	J400	J396

Interconnection Cables for first 2.5G shelf to third 2.5G shelf

Table 3-8. Required backplane cables and associated labels to connect the first 2.5G shelf (main I/O shelf) to the third 2.5G shelf

ED8C789-21	Label for first 2.5G end of cable	Label for third 2.5G end of cable
GR20	J407	J491
GR20	J488	J490
GR30	J401	J395
GR30	J402	J396

Interconnection Cables for first 2.5G shelf to fourth 2.5G shelf

Table 3-9. Required backplane cables and associated labels to connect the first 2.5G shelf (main I/O shelf) to the fourth 2.5G shelf

ED8C789-21	Label for first 2.5G end of cable	Label for second 2.5G end of cable
GR20	J408	J491
GR20	J489	J490
GR30	J403	J395
GR30	J404	J396

Backplane Cables for Interconnection of 10G and 2.5G Shelves in 10G System (Continued)

Procedure to Install 2.5G and 10G Interconnecting Cables

Table 3-10.   **Follow the steps below to install the cables between the 10G shelf and the 2.5G I/O shelf/shelves.**

⚠ **CAUTION:**
*When installing all cables, make sure to tie cables to the appropriate towel bar (see ED8C789-16) **before** connecting to the backplane. This will avoid damage to the backplane connectors from excessive cable weight.*

Step	Action
1	Label the cables as shown in Table 3-3. If a second 2.5G shelf is installed, label the cables as shown in Table 3-6 and Table 3-7. If a third 2.5G is installed, label the cables as shown in Table 3-8 and Table 3-8. If a fourth 2.5G shelf is installed, label the cables as shown in Table 3-6 and Table 3-9. Pre-made labels are not provided. Refer to ED8C789-16 for cable routing and dressing information. ➡ **NOTE:** **IMPORTANT**: On one side of each connector at the ends of these cables there are three adjacent holes. When installing these cables, **make sure the side of the connector with the 3 adjacent holes is toward the black strain-relief device on the backplane**. Make sure the strain-relief device clicks into the 3 holes on the connector. *Refer to ED8C789-16, Installers Cabling Plan for a 10G Bay System, for cable routing diagrams.*
	Continued on next page

Step	Action
2	Starting with the G20 and G30 cables, run the cables listed below. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below.

⇒ **NOTE:**
   For the FIRST 2.5G shelf only (main I/O shelf, also called main tributary shelf), leave jumpers P395 & P491 in place.

At 10G, connect:	At First 2.5G, connect:
J7 to P7 (G20)	J409 to P409 (G20)
J8 to P8 (G20)	J405 to P405 (G20)
J9 to P9 (G20)	J492 to P492 (G20)
J10 to P10 (G20)	J494 to P494 (G20)
J5 to P5 (G30)	J397 to P397 (G30)
J6 to P6 (G30)	J398 to P398 (G30)

Step	Action
3	Run the G10 and G11 cables listed below from the 10G to the first 2.5G shelf. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below. For the G11 cables, make sure the end with the "10G CONN" label is connected to the 10G.

At 10G, connect:	At First 2.5G, connect:
J12 to P12 (G10)	J510 to P510 (G10)
J16 to P16 (G10)	J516 to P516 (G10)
J36 to P36 (G10)	J498 to P498 (G10)
J40 to P40 (G10)	J504 to P504 (G10)
J21 to P21 (G11) ["10G CONN" label end]	J512 to P512 (G11)
J25 to P25 (G11) ["10G CONN" label end]	J518 to P518 (G11)
J29 to P29 (G11) ["10G CONN" label end]	J500 to P500 (G11)
J33 to P33 (G11) ["10G CONN" label end]	J506 to P506 (G11)

Continued on next page

Step	Action
4	If additional shelves are to be used. Determine which Pproc Port to connect the cables to.

IF using...	Then..
• STS576 cards are used in the 10G shelf or • If OC-192 UPSR may be used	Use Option 1: Shelf 2 uses Pproc Port B and Shelf 3 uses Pproc Port C.
Any other application	Use Option 2. Shelf 2 uses Pproc Port C and Shelf 3 uses Pproc Port B

Step	Action
5	If additional shelves are to be used. Determine which Pproc Port to connect the cables to.

IF using...	Then..
Option 1	Continue with Step 6
Option 2	Continue with Step 10

Step	Action
6	OPTION 1: If a second 2.5G shelf is installed, run the G20 and G30 cables between the First and second 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below. ⇒ **NOTE:** For the SECOND 2.5G shelf, remove jumpers P395 & P491 and replace with the appropriate cable assemblies. [Leave these jumpers in place on the FIRST 2.5G shelf.]

At First 2.5G, connect:	At Second 2.5G, connect:
J406 to P406 (G20)	J491 to P491 (G20)
J410 to P410 (G20)	J490 to P490 (G20)
J493 to P493 (G20)	J496 to P496 (G20)
J495 to P495 (G20)	J497 to P497 (G20)
J399 to P399 (G30)	J395 to P395 (G30)
J400 to P400 (G30)	J396 to P396 (G30)

Continued on next page

Step	Action
7	OPTION 1: If a second 2.5G shelf is installed, run the G10 and G11 cables between the 10G and second 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below. For the G11 cables, make sure the end with the "10G CONN" label is connected to the 10G.

At 10G, connect:	At Second 2.5G, connect:
J20to P20 (G10)	J512 to P512 (G10)
J24 to P24(G10)	J518 to P518(G10)
J28 to P28 (G10)	J500 to P500 (G10)
J32 to P32 (G10)	J506 to P506 (G10)
J13 to P13(G11) ["10G CONN" label end]	J510 to P510 (G11)
J17 to P17(G11) ["10G CONN" label end]	J516 to P516 (G11)
J37 to P37(G11) ["10G CONN" label end]	J498to P498 (G11)
J41 to P41 (G11) ["10G CONN" label end]	J504 to P504 (G11)

Step	Action
8	OPTION 1: If a third 2.5G shelf is to be installed, run the G20 and G30 cables between the 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below. ⇒ NOTE: For the THIRD 2.5G shelf, remove jumpers P395 & P491 and replace with the appropriate cable assemblies. [Leave these jumpers in place on the FIRST 2.5G shelf.]

At First 2.5G, connect:	At Third 2.5G, connect:
J407 to P407 (G20)	J491 to P491 (G20)
J488 to P488 (G20)	J490 to P490 (G20)
J401 to P401 (G30)	J395 to P395 (G30)
J402 to P402 (G30)	J396 to P396 (G30)

Continued on next page

Step	Action
9	OPTION 1: If a third 2.5G shelf is installed, run the G10 and G11 cables between the 10G and third 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below. For the G11 cables, make sure the end with the "10G CONN" label is connected to the 10G.

At 10G, connect:	At Third 2.5G, connect:
J14to P14 (G10)	J510 to P510 (G10)
J18 to P18 (G10)	J516 to P516 (G10)
J38 to P38 (G10)	J498 to P498 (G10)
J42 to P42 (G10)	J504 to P504 (G10)
J23 to P23 (G11) ["10G CONN" label end]	J512 to P512 (G11)
J27to P27 (G11) ["10G CONN" label end]	J518 to P518 (G11)
J31 to P31 (G11) ["10G CONN" label end]	J500 to P500 (G11)
J35 to P35 (G11) ["10G CONN" label end]	J506 to P506 (G11)

Step	Action
10	OPTION 2: If a second 2.5G shelf is to be installed, run the G20 and G30 cables between the 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below.

⮕ NOTE:
   For the SECOND 2.5G shelf, remove jumpers P395 & P491 and replace with the appropriate cable assemblies. [Leave these jumpers in place on the FIRST 2.5G shelf.]

At First 2.5G, connect:	At Second 2.5G, connect:
J406 to P406 (G20)	J491 to P491 (G20)
J410 to P410 (G20)	J490 to P490 (G20)
J493 to P493 (G20)	J496 to P496 (G20)
J495 to P495 (G20)	J497 to P497 (G20)
J399 to P399 (G30)	J395 to P395 (G30)
J400 to P400 (G30)	J396 to P396 (G30)

Continued on next page

Step	Action
11	Option 2: If a second 2.5G shelf is installed, run the G10 and G11 cables between the 10G and second 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below. For the G11 cables, make sure the end with the "10G CONN" label is connected to the 10G.

At 10G, connect:	At Second 2.5G, connect:
J14to P14 (G10)	J510 to P510 (G10)
J18 to P18 (G10)	J516 to P516 (G10)
J38 to P38 (G10)	J498 to P498 (G10)
J42 to P42 (G10)	J504 to P504 (G10)
J23 to P23 (G11) ["10G CONN" label end]	J512 to P512 (G11)
J27to P27 (G11) ["10G CONN" label end]	J518 to P518 (G11)
J31 to P31 (G11) ["10G CONN" label end]	J500 to P500 (G11)
J35 to P35 (G11) ["10G CONN" label end]	J506 to P506 (G11)

Step	Action
12	Option 2: If a third 2.5G shelf is installed, run the G20 and G30 cables between the First and third 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below.

> **NOTE:**
> For the THIRD 2.5G shelf, remove jumpers P395 & P491 and replace with the appropriate cable assemblies. [Leave these jumpers in place on the FIRST 2.5G shelf.]

At First 2.5G, connect:	At Third 2.5G, connect:
J407 to P407 (G20)	J491 to P491 (G20)
J488 to P488 (G20)	J490 to P490 (G20)
J401 to P401 (G30)	J395 to P395 (G30)
J402 to P402 (G30)	J396 to P396 (G30)

Continued on next page

Step	Action
13	Option 2: If a third 2.5G shelf is installed, run the G10 and G11 cables between the 10G and third 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below. For the G11 cables, make sure the end with the "10G CONN" label is connected to the 10G.

At 10G, connect:	At Third 2.5G, connect:
J20to P20 (G10)	J512 to P512 (G10)
J24 to P24(G10)	J518 to P518(G10)
J28 to P28 (G10)	J500 to P500 (G10)
J32 to P32 (G10)	J506 to P506 (G10)
J13 to P13(G11) ["10G CONN" label end]	J510 to P510 (G11)
J17 to P17(G11) ["10G CONN" label end]	J516 to P516 (G11)
J37 to P37(G11) ["10G CONN" label end]	J498to P498 (G11)
J41 to P41 (G11) ["10G CONN" label end]	J504 to P504 (G11)

Step	Action
14	If a fourth 2.5G shelf is installed, run the G20 and G30 cables between the 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below.

⊨⟩ **NOTE:**
  For the THIRD 2.5G shelf, remove jumpers P395 & P491 and replace with the appropriate cable assemblies. [Leave these jumpers in place on the FIRST 2.5G shelf.]

At First 2.5G, connect:	At Second 2.5G, connect:
J408 (G20)	J491
J489 (G20)	J490
J403 (G30)	J395
J404 (G30)	J396

Continued on next page

Step	Action
15	If a fourth 2.5G shelf is installed, run the G10 and G11 cables between the 10G and fourth 2.5G shelves. Before connecting cables to backplane, tie cables to the appropriate towel bar (see ED8C789-16). Once cables are tied down, connect in the sequence listed below. For the G11 cables, make sure the end with the "10G CONN" label is connected to the 10G.

At 10G, connect:	At Fourth 2.5G, connect:
J22 to P22 (G10)	J512 to P512 (G10)
J26 to P26 (G10)	J518 to P5186 (G10)
J30 to P30 (G10)	J500 to P500 (G10)
J34 to P34(G10)	J506 to P506 (G10)
J22 to P22(G11) ["10G CONN" label end]	J510 to P510 (G11)
J26 to P26 (G11) ["10G CONN" label end]	J516 to P516 (G11)
J30 to P30 (G11) ["10G CONN" label end]	J498 to P498 (G11)
J34 to P34 (G11) ["10G CONN" label end]	J504 to P504 (G11)

Step	Action
16	Continue with next procedure "Power Cables".
17	**Stop! End of Task.**

Power Cables

Background   The 2.5G and 10G shelves are powered by -48 volt Direct Current. Since redundant power is used to ensure maximum availability of the shelf, two battery power feeders are required for each shelf (usually feed A is Red and feed B is Blue). The available cables are provided in drawings ED9C280-25 and ED9C280-28. Some of the standard cables are listed below for reference.

Available Power Cables

Table 3-11.   ED9C280-25 Power Cables

System	ED9C280-25	Gauge	Color	Length	Load
2.5G	GR 1	8	Red	12 ft.	A
2.5G	GR 2	8	Blue	12 ft.	B

Table 3-12.   ED9C280-28 Power Cables

System	ED9C280-28	Gauge	Color	Length	Load
2.5G/10G	GR 65	6	Red & Blue	12 ft.	A & B
2.5G/10G	GR 66	6	Red & Blue	50 ft.	A &B
2.5G/10G	GR 67	6	Red & Blue	75 ft.	A & B
2.5G/10G	GR 68	6 spliced to 2/0	Red & Blue	50 ft.	A & B
2.5G/10G	GR 69	6 spliced to 2/0	Red & Blue	75 ft.	A & B

Power Cables (Continued)

**Connectiong
Information for
Power Cables**

The power cables are connectorized on one end and are keyed to be inserted into the 10G and 2.5G shelves. The connectors on the red and blue cables are labeled Load A and Load B and plug into the corresponding connectors on the 10G and 2.5G shelves (refer to Figure 3-1).

Connect one pair of power cables to each 10G and 2.5G shelf. The red cable (Load A) is connected to the right side power connector, as viewed from the back of the shelf; the blue cable (Load B) is connected to the left side.

Refer to ED8C789-16 (10G) or ED8C789-15 (2.5G) for additional cabling information (cable routing and dressing). Also refer to Figure 3-1, which shows the cable connected to Load A.

After completing power cable installation, continue with next procedure "Timing Cables".

Power Connections

Release
Button
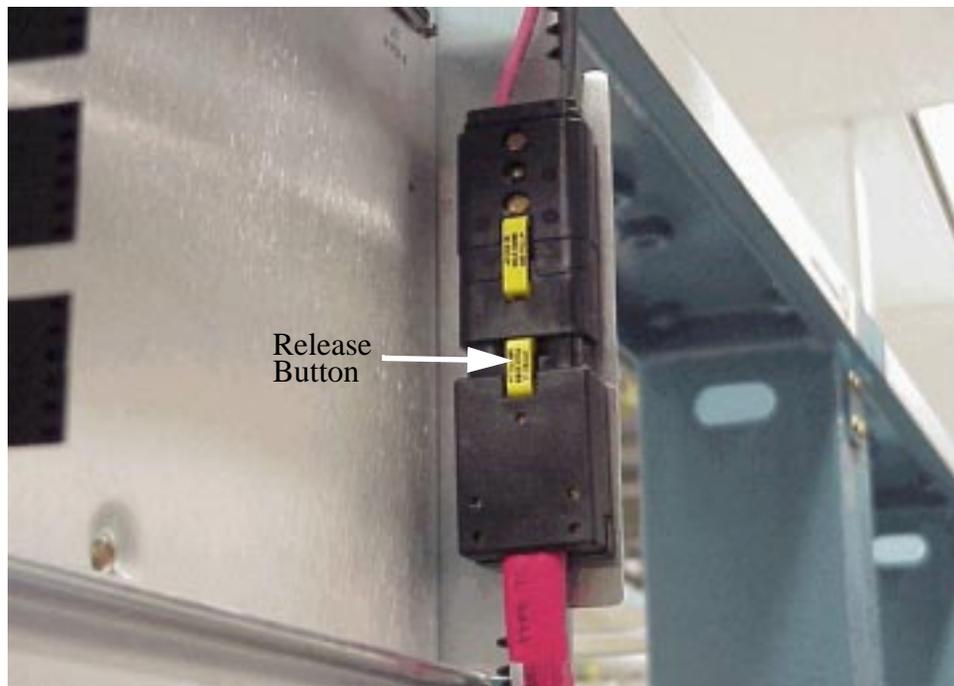
Figure 3-1.   The figure above illustrates the proper power cable connections.

Cabling for Timing, Office Alarms, Miscellaneous Discretes and LAN

Introduction   This section provides installation information for the Timing, Office Alarms, Miscellaneous Discretes, and LAN cables.

Backplane Connectors on 2.5G Shelf for Timing, Office Alarms, and Miscellaneous Discretes

Figure 3-2.   **Connectors on the WaveStar™ TDM 2.5G (OC-48) standalone backplane.**

Timing Cables

Background

Timing cables provide external DS1 clock sources to the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelves for locked timing operations.

The Timing Cables for the 10G system are connected to the first 2.5G shelf (main I/O shelf) ONLY.

Available Cables

The available timing cables are listed below. Timing cables may be provided as part of a cable kit (e.g. ED8C789-28 G1 or G2).

Table 3-13.   Timing Cables

ED8C900-21	Length
GR1	50 ft.
GR2	100 ft.
GR3	150 ft.
GR4	200 ft.
GR5	300 ft.
GR6	500 ft.

Connecting Information

Both the 2.5G standalone and the 10G systems require two timing references. Before connecting the timing reference cables to the backplane, make sure to tie them to the appropriate towel bar (see ED8C789-16 for 10G, or ED8C789-15 for 2.5G). This will avoid damage to the backplane connectors from excessive cable weight. Once supported, connect one timing reference to J42 (SVCE TMG IN or EXTTMG1) and the other to J36 (PROT TMG IN or EXTTMG0) on the backplane of the 2.5G shelf. Connect the unterminated end of the cables to a building integrated timing supply (BITS) clock. The system supports timing sources of SF (super frame) and ESF (extended super frame).

For a WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) system, the timing inputs are on the first 2.5G shelf only, (refer to Figure 3-2). No timing cables are connected to the 10G shelf or additional 2.5G shelves.

Timing Cables (Continued)

Procedure to Install Timing Cables

Table 3-14.   Follow the steps outlined below to install the timing cables.

⟹ **NOTE:**
If you are installing a 10G system, NO timing cables are installed on the 10G shelf or additional 2.5G shelves, **only** on the main 2.5G shelf

.

Step	Action		
1	Label the cables with the correct labels supplied. • P42 for the cable connecting to the SVCE TMG IN or EXTTMG1 connector J42 • P36 for the cable connecting to the PROT TMG IN or EXTTMG0 connector J36		
2	**If:**	**Then:**	
	Using the ED8C900-21 connectorized timing cables,	Tie the cables to the appropriate towel bar (see ED8C789-16 for 10G or ED8C789-15 for 2.5G).	
		Connect the cable labeled (P42) to the connector labeled (J42) on the 2.5G (main I/O shelf) backplane.	
		Connect the cable labeled (P36) to the connector labeled (J36) on the 2.5G/10G (2-Fiber) backplane.	
	Wire-wrapping to the 9L Filtered connector (Comcode 408267722) shown in Figure 3-3 and in the diagram to the right,	If using the ED8C900-21 timing cable, remove the existing connector. Connect the black wire of the timing cable (from terminal 1 of P42) to pin R1 of the 9L connector. Connect the white wire (from terminal 6 of P42) to T1. Repeat for P36. Connect the ground wire. Refer to diagram below and ED8C789-16 (10G) or ED8C789-15 (2.5G) for detailed information. 	
		Continued on next page	
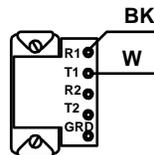
Step	Action
3	Connect the unterminated end of the cables to a BITS clock (refer to Table 3-15). No ground connection is necessary at the BITS clock end of cable.
4	Continue with next procedure "Office Alarms Cables".
5	**Stop! End of Task.**

Timing Cables (Continued)

9L Filtered Connector Information

The figure below shows the 9L connector on the J42 timing connector of the 2.5G backplane. This connector is used to wire-wrap the timing cable to the backplane instead of using a connectorized cable, and is used mainly for the purpose of verifying the DS1 reference signal without having to remove the timing cable.
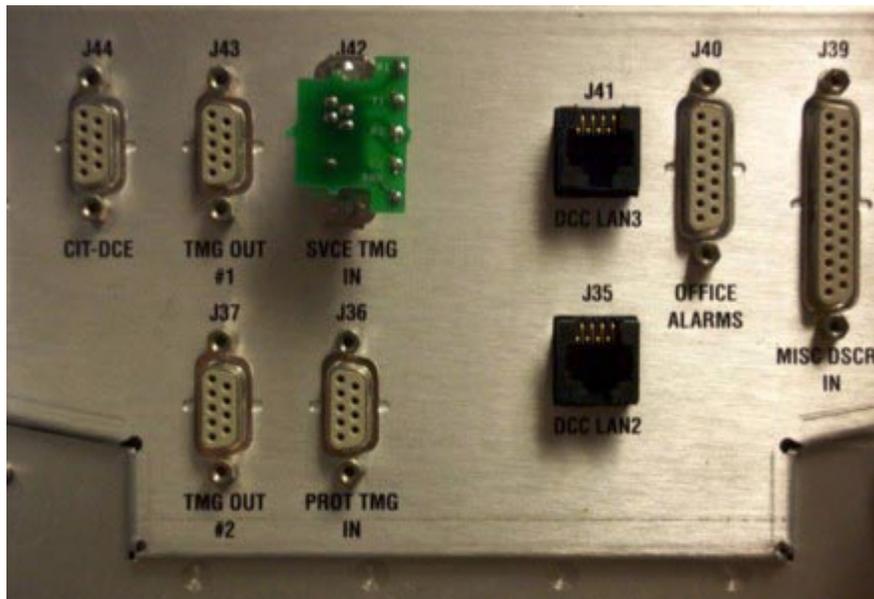
Figure 3-3.   9L Filtered connector for wire-wrapped timing input cable.

Color Code

Table 3-15.   The table below lists the connections for the timing cables.

Plug	Pin	Color	External Connection
P42	1	White	Positive
P42	6	Black	Negative
P36	1	White	Positive
P36	6	Black	Negative

Office Alarms

Background
Office alarms are commonly used by central office maintenance personnel to quickly identify failed equipment. Office alarm connections are used on the Main 2.5G only.

Available Cables
The available office alarm cables are listed below. These cables may be provided as part of a kit (e.g. ED8C789-28 G1 or G2).

Table 3-16.   Office Alarm Cables

ED8C900-21	Length
GR20	50 ft.
GR21	100 ft.
GR22	150 ft.
GR23	200 ft.
GR24	300 ft.

Connection Information
Before connecting the office alarm cables to the backplane, make sure to tie them to the appropriate towel bar (se ED8C789-15 for 2.5G). This will avoid damage to the backplane connectors from excessive cable weight. Once the cables are supported, the connectorized end of the Office Alarm cable is connected to (J40) on the backplane of the main 2.5G shelf. The unterminated end of the Office Alarm cable is connected to an office alarm system.

Office Alarms (continued)

Procedure to Install Office Alarm Cables

Table 3-17.   Follow the steps below for main 2.5G shelf.

Step	Action
1	Label each office alarm cable with the correct label: • (P40) for Office Alarm cable
2	Tie the cables to the appropriate towel bar (see ED8C789-15 for 2.5G).
3	Connect the cable labeled (P40) to the connector labeled (J40) on the backplane.
4	Connect the unterminated end of the cable to the office alarm system (refer to Table 3-15).
5	Continue with next procedure "Miscellaneous Discrete Cables".

Color Code

Table 3-18.   The table below lists the color code for the Office Alarm Cable

Color Code	Label	Color Code	Label
W-BL	OALMOR	BL-W	OALMONO
W-O	CRAUDR	O-W	CRAUDNO
W-G	CRVISR	G-W	CRVISNO
W-BR	MJAUDR	BR-W	MJAUDNO
W-S	MJVISR	S-W	MJVISNO
R-BL	MNAUDR	BL-R	MNAUDNO
R-O	MNVISR	O-R	MNVISNO

Miscellaneous Discrete Cables

Background

Miscellaneous Discrete Input points provide a means for notifying an operations system (OS) maintenance center of environmental conditions at the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) site. Miscellaneous Discrete Output points provide a means of controlling environmental equipment at a WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) site. Input and output connections are used at main 2.5G shelf.

Available Cables

The available Miscellaneous Discrete Cables are listed below. These cables may be provided as part of a kit (e.g. ED8C789-28 G1 or G2).

Table 3-19.   Miscellaneous Discrete Input/Output Cables

ED8C900-21	Length
GR30	50 ft.
GR31	100 ft.
GR32	150 ft.
GR33	200 ft.
GR34	300 ft.

Miscellaneous Discrete Cables (Continued)

Connection Information

Before connecting the miscellaneous discrete cables to the backplane, make sure to tie them to the appropriate towel bar (see ED8C789-16). This will avoid damage to the backplane connectors from excessive cable weight. Once the cables are supported, the input cable is connected to (J39) and the output cable is connected to (J38) on the backplane of main 2.5G shelf (refer to Figure 3-2). The unterminated ends of the cables are connected to a miscellaneous discrete terminal strip. The terminal strip is not part of the 2.5G shelf.

Procedure to Install Miscellaneous Discrete Cables

Table 3-20.   Follow the steps below to install the Miscellaneous Discrete Cables at the Main 2.5G and 10G shelf.

Step	Action
1	Label the cables with the correct labels. • (P39) for the Input cable • (P38) for the Output cable
2	Tie the cables to the appropriate towel bar (see ED8C789-15 for 2.5G).
3	Connect the cable labeled (P39) to the connector labeled (J39) on the 2.5G backplane
4	Connect the cable labeled (P38) to the connector labeled (J38) on the 2.5Gbackplane.
5	Connect the unterminated end of each cable to the miscellaneous discrete terminal strip (refer to Table 3-21 and Table 3-22).
6	Continue with next procedure "LAN Cables".

Miscellaneous Discrete Cables (Continued)

Connecting Table   **Table 3-21.**   **The table below lists the color code for the Miscellaneous Discrete Input cable for the 2.5G shelf.**

Color Code	Pin #*	Label	Color Code	Pin #*	Label
G-W	3	MDIN0	W-G	16	MDIN1
BR-W	4	MDIN2	W-BR	17	MDIN3
S-W	5	MDINCOM0	W-S	18	MDINCOM1
BL-R	6	MDIN4	R-BL	19	MDIN5
O-R	7	MDIN6	R-O	20	MDIN7
G-R	8	MDIN8	R-G	21	MDIN9
BR-R	9	MDIN10	R-BR	22	MDIN11
S-R	10	MDINCOM2	R-S	23	MDINCOM3
BL-BK	11	MDIN12	BK-BL	24	MDIN13
O-BK	12	MDIN14	BK-O	25	MDIN15

* There are no connections to pins 1, 2, 13, 14, and 15.

Miscellaneous Discrete Cables (Continued)

Connecting Table (Continued)

Table 3-22. The table below lists the color code for the Miscellaneous Discrete Output cable for the 2.5G shelf.

Color Code	Pin #*	Label	Color Code	Pin #*	Label
S-W	5	MDOUT0	W-S	18	MDOUT0R
BL-R	6	MDOUT1	R-BL	19	MDOUT1R
O-R	7	MDOUT2	R-O	20	MDOUT2R
G-R	8	MDOUT3	R-G	21	MDOUT3R
BR-R	9	MDOUT4	R-BR	22	MDOUT4R
S-R	10	MDOUT5	R-S	23	MDOUT5R
BL-BK	11	MDOUT6	BK-BL	24	MDOUT6R
O-BK	12	MDOUT7	BK-O	25	MDOUT7R
G-BK	13	GRD			

* There are no connections to pins 1 through 4 and 14 through 17.

LAN (Local Area Network) Cables

Background   LAN cables are used to connect the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) systems to a network via a hub or to a PC running WaveStar® CIT software.

Available Cables   The available LAN cables are listed below. These cables may be provided as part of a kit (e.g. ED8C789-28 G1 or G2).

Table 3-23.   LAN cables

ED8C900-21 (Straight Cables)	ED8C900-21 (Cross-over Cables)	Length
GR 50	GR 80	50 ft.
GR 51	GR 81	100 ft.
GR 52	GR 82	150 ft.
GR 53	GR 83	200 ft.
GR54	GR 84	300 ft.

Connection Information   Use the following procedure to connect the LAN cables.

Step	Action
1	One LAN cable is connected to any of the three RJ45 connector jacks on a 2.5G or 10G shelf. There are two jacks on the rear of each shelf labeled J35 (DCC LAN2) and J41 (DCC LAN3). There is also one jack on the front of each shelf located on the user panel. The other end is connected to the LAN card of a PC running WaveStar™ CIT software, or to a hub.
2	*Continued on next page*

Step	Action
3	Use a straight cable to connect directly from the PC's LAN card to the 2.5G or 10G shelf. If connecting via a hub, use a cross-over cable to connect the hub to the 2.5G or 10G shelf. Then use a straight cable to connect the hub to the PC's LAN card.
4	One LAN cable is required for connection between the PC running the WaveStar™ CIT software and the 2.5G standalone shelf or 10G system.
5	After installing the appropriate LAN cable(s), continue with the next procedure "DS3/EC1 Ribbon Cables".

DS3/EC1 Ribbon Cables

Background

The DS3/EC1 ribbon cables are used to connect the WaveStar® TDM 2.5G (OC-48) shelf to the associated DS3/EC1 connector panels. There are no DS3/EC1 connector panels used with the 10G shelf.

There are three types of DS3/EC1 panels:

- ED8C789-34 G1 and G2 panels, which mount horizontally in the bay, above and below the 2.5G shelf.

- ED9C280-31 G160 panels, which mount vertically to the left and right of the 2.5G shelf and provide front-access to the DS3/EC1 connectors.

- ED8C789-34 G10 and G11 panels, which mount vertically on the rear on the 2.5G shelf between the backplane and the rear cover and provide rear-access to the DS3/EC1 connectors.

Available Cables for WaveStar™ TDM 2.5G (OC-48)

One DS3/EC1 cable assembly (6 cables) is required for each DS3/EC1 connector panel to be installed. Cables are shipped with the DS3/EC1 connector panel. DS3/EC1 connector panels are used with the 2.5G shelves only, either for standalone 2.5G Network Elements, or for 2.5G shelves that are part of a 10G Network Element. They are not used with the 10G shelf itself.

Procedure to Install DS3/EC1 Cables

Table 3-24.   Follow the steps below to install the DS3/EC1 ribbon cables for each DS3/EC1 panel.

Step	Action
1	Make and attach the label to each end of the ribbon cables. Refer to the "Cable Label" column in Table 3-25.
2	Install each DS3/EC1 ribbon cable according to Table 3-25 and Figure 3-4 and Figure 3-5 (for front-access vertically-mounted DS3 panels), or Figure 3-6 (for front-access horizontally-mounted DS3 panels), or Figure 3-7 (for rear-access vertically-mounted DS3 panels).
3	Continue with next procedure "Fiber Cables".

DS3/EC1 Ribbon Cables (Continued)

Connecting Table for WaveStar™ TDM 2.5G (OC-48)

Table 3-25. The table below lists the connections from the WaveStar™ TDM 2.5G (OC-48) backplane to the DS3/EC1 connector panels.

Ribbon Cable Patching Interconnect (Refer to Figure 3-4 through Figure 3-7 for connection locations on panel and shelf)						
DS3/EC1 Connector Panel				WaveStar™ 2.5G Backplane		
Location	Connector	Panel Designation	Cable Label	Connector	Panel Designation	Cable Label
Right side of 2.5G shelf from rear or below 2.5G shelf	J1	Out 33-48	P1	J23	Out PU 5-6	P23
	J2	Out 17-32	P2	J22	Out PU 3-4	P22
	J3	Out 1-16	P3	J21	Out PU 1-2	P21
	J4	In 33-48	P4	J29	In PU 5-6	P29
	J5	In 17-32	P5	J28	In PU 3-4	P28
	J6	In 1-16	P6	J27*	In PU 1-2	P27
Left side of 2.5G shelf from rear or above 2.5G shelf	J7	Out 33-48	P7	J26	Out PU 15-16	P26
	J8	Out 17-32	P8	J25	Out PU 13-14	P25
	J9	Out 1-16	P9	J24	Out PU 11-12	P24
	J10	In 33-48	P10	J32*	In PU 15-16	P32
	J11	In 17-32	P11	J31	In PU 13-14	P31
	J12	In 1-16	P12	J30	In PU 11-12	P30

* When connecting DS3 cables to J27 and J32, if the -48V power connector prevents access to the connectors, use a phillips head screwdriver to temporarily detach the power connector from the shelf assembly, then move the power connector and connect the DS3 cable, then reattach the power connector.

DS3/EC1 Ribbon Cables (Continued)

Right side front-access vertically-mounted DS3/EC1 panel

LEFT SIDE RIBBON CABLE (# 407892405) WIRING

RIBBON CABLE CONNECTING TABLE

CABLE	FROM	TO
1ST	J7	J26
2ND	J8	J25
3RD	J9	J24
4TH	J10	J32
5TH	J11	J31
6TH	J12	J30

NOTES:

1- CONNECT RIBBON CABLES FROM INTERCONNECT PANEL TO CONNECTOR PANEL PER SEQUENCE SHOWN (1ST TO 6TH).
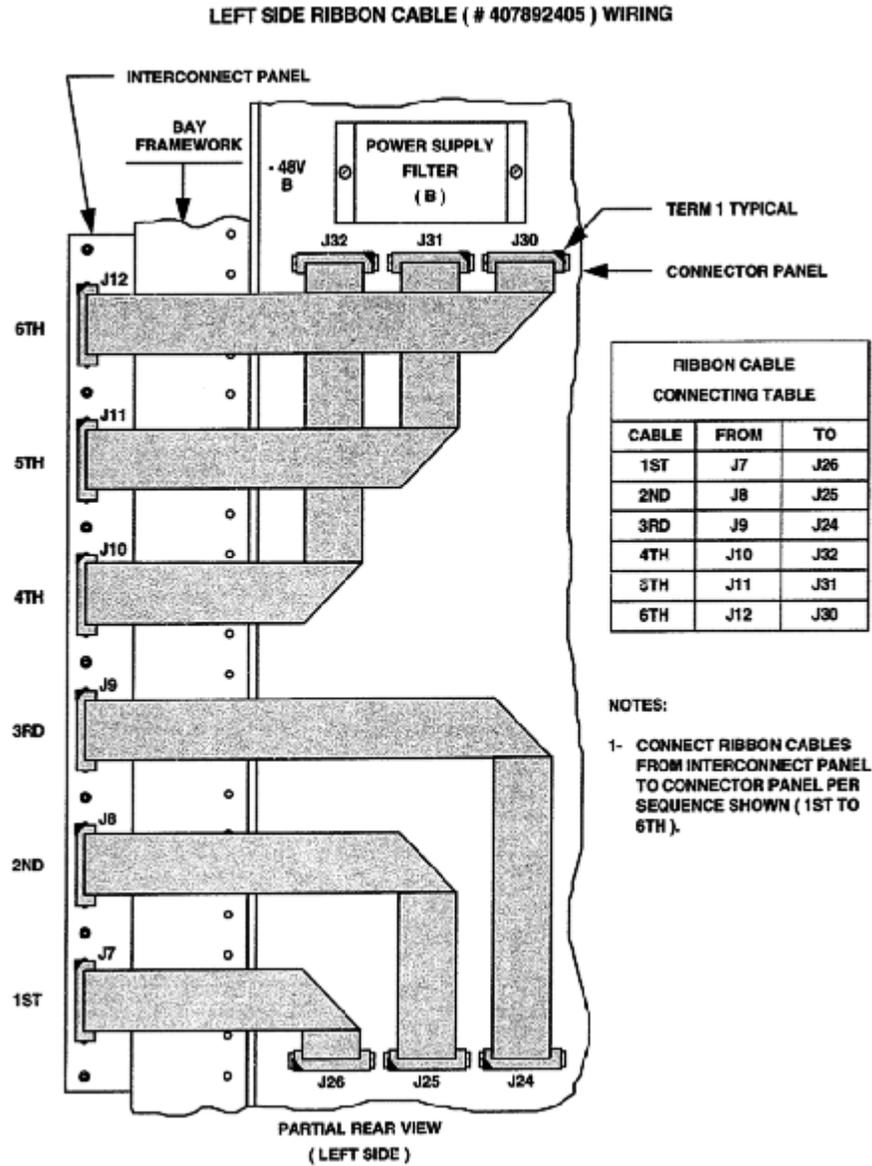
Figure 3-4. This figure displays the proper ribbon cable connections for the front-access DS3/EC1 connector panel on the right side of a WaveStar™ TDM 2.5G (OC-48) shelf (as viewed from front of equipment, i.e. left side as viewed from rear of equipment).

DS3/EC1 Ribbon Cables (Continued)

Left side front-access vertically-mounted DS3/EC1 panel

RIGHT SIDE RIBBON CABLE (# 407892405) WIRING

RIBBON CABLE CONNECTING TABLE

CABLE	FROM	TO
1ST	J3	J21
2ND	J2	J22
3RD	J1	J23
4TH	J4	J29
5TH	J5	J28
6TH	J6	J27

NOTES:

1- CONNECT RIBBON CABLES FROM INTERCONNECT PANEL TO CONNECTOR PANEL PER SEQUENCE SHOWN (1ST TO 6TH).

PARTIAL REAR VIEW
(RIGHT SIDE)
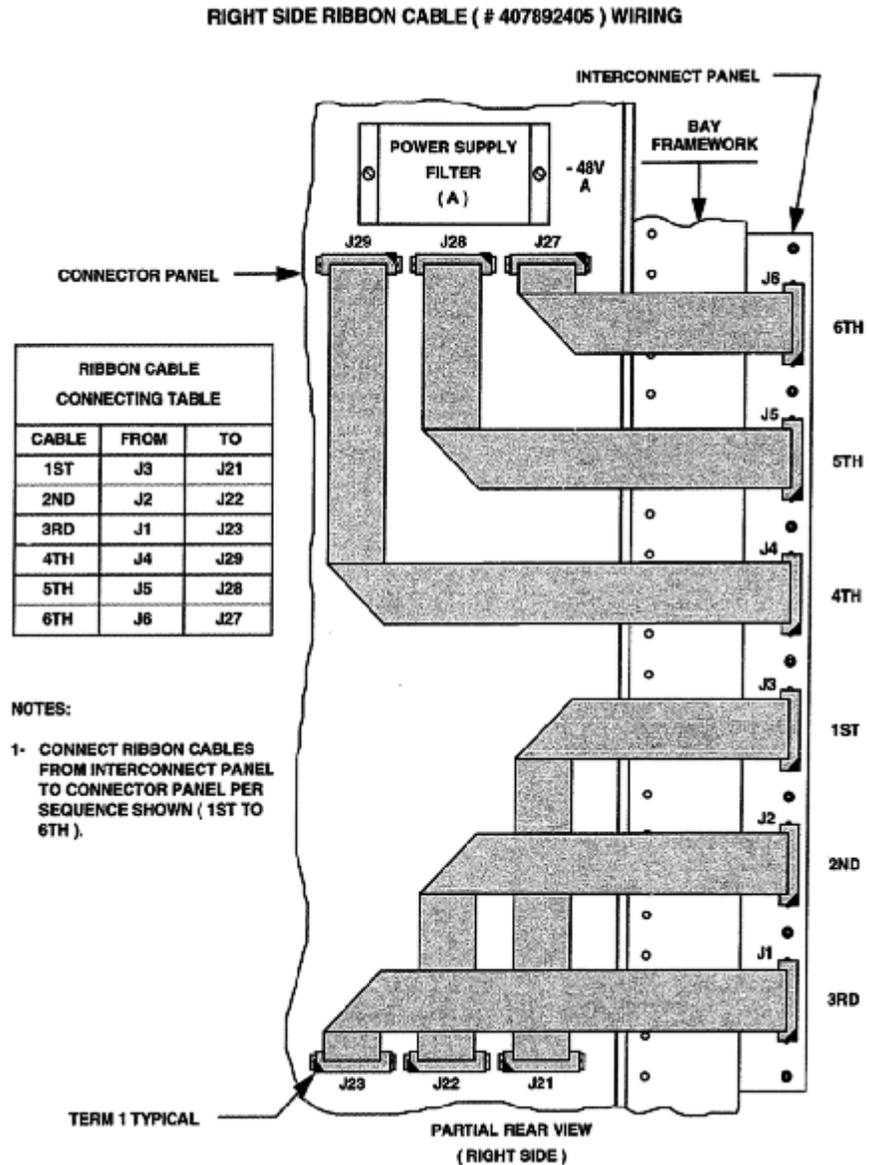
Figure 3-5. **This figure displays the proper ribbon cable connections for the DS3/ EC1 connector panel on the left side of a WaveStar™ TDM 2.5G (OC-48) shelf (as viewed from front of equipment, i.e. right side as viewed from rear of equipment).**

DS3/EC1 Ribbon Cables (Continued)

Front-access horizontally-mounted DS3/EC1 panels
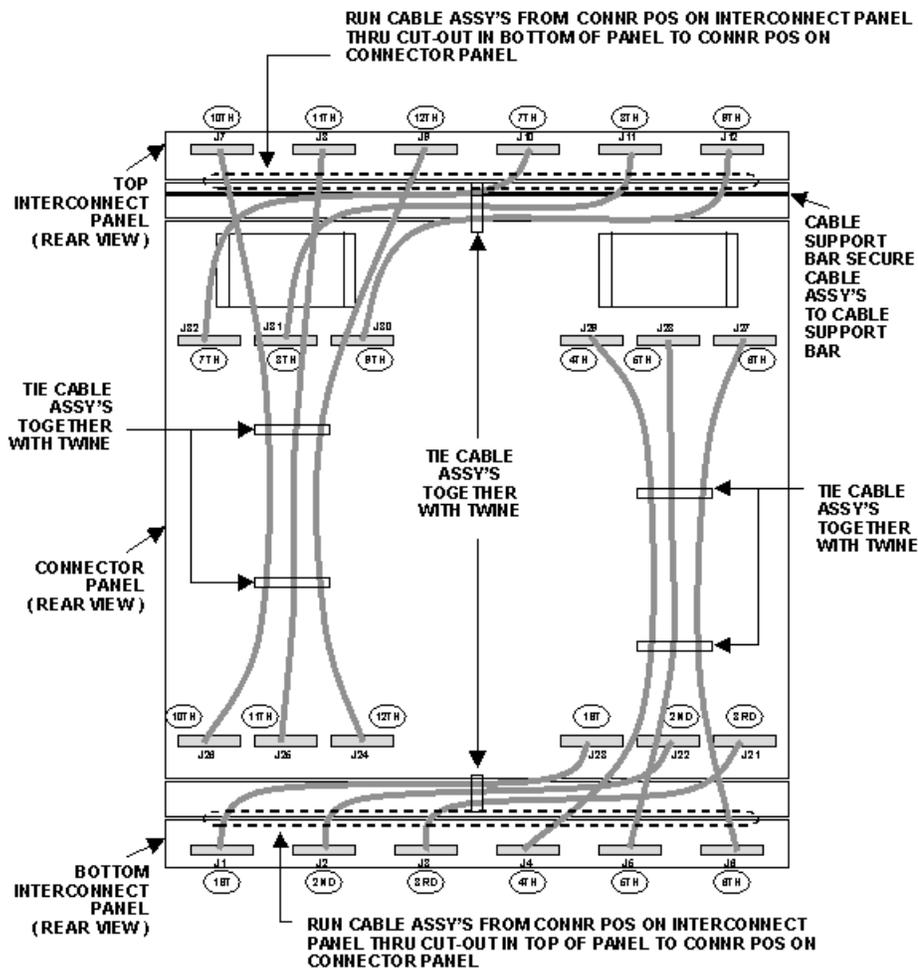
Figure 3-6. This figure displays the proper ribbon cable connections for the DS3/EC1 connector panels installed above and below WaveStar TDM 2.5G (OC-48) shelf.

DS3/EC1 Ribbon Cables (Continued)

**Rear-access
vertically-mounted
DS3/EC1 panels**
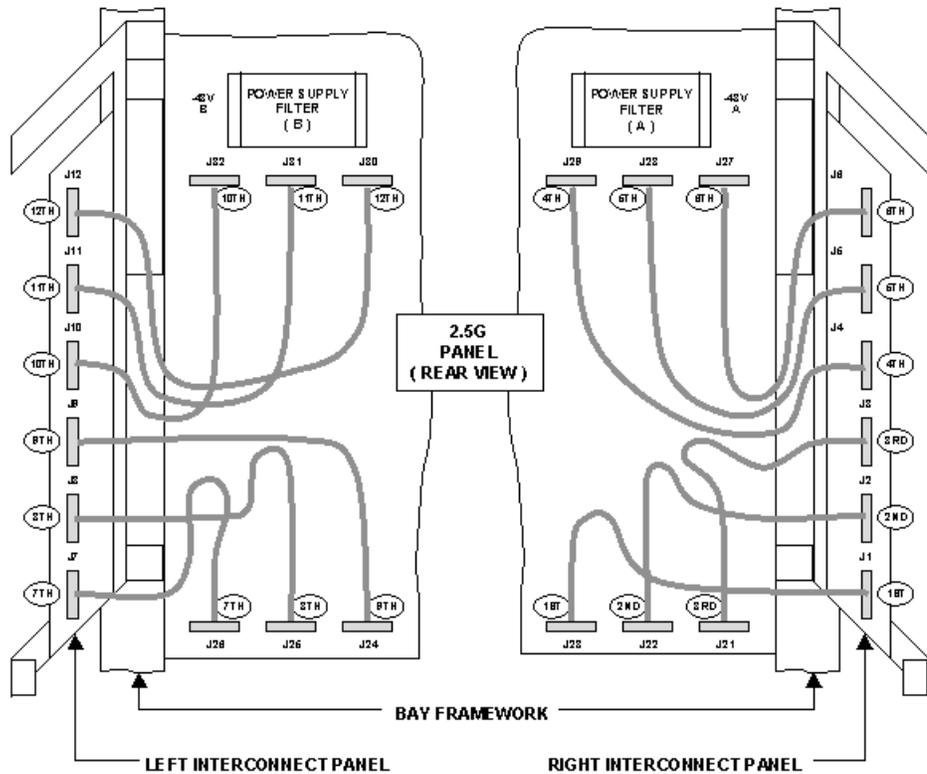
Figure 3-7.   This figure displays the proper ribbon cable connections for the DS3/
EC1 connector panels installed at the rear of WaveStar™ TDM 2.5G
(OC-48) shelf.

Fiber Cables

Background The WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Network Elements use fiber cables for ring connections between Network Elements and to communicate with low-speed equipment (e.g. OC-3, OC-12).

Available Cables Refer to Chapter 7 in this document for available fiber cables for the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelves.

Connection Information Refer to Chapter 7 in this document for fiber connections for the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelves.

Final Operations

After completing the cable installation (including optical fiber cables), make sure that all cables are labeled. Then continue with the next chapter, "Powering, Circuit Pack Installation, and Software Installation".

Physical and Power Installation Exit Checklist

The following provides a checklist to be completed after the completion of the physical and power installation. Verify that each procedure has been completed, check off, and initial the item. If not applicable, indicate "NA".

Completed	Initials	Item (Procedure)	Notes
		Equipment Installation Information	
		Standalone 2.5G Equipment Installation	
		10G Equipment Installation	
		2.5G/10G Equipment Installation	
		Front-Access Vertical DS3/EC1 Connector Panels	
		Tie Bar Installation	
		Rear-Access Vertical DS3/EC1 Connector Panels	
		Backplane Cables for Interconnection of 10G and 2.5G Shelves in 10G System	
		Power Cables	
		Cabling for Timing, Office Alarms, Miscellaneous Discretes and LAN	
		Timing Cables	
		Office Alarms	
		Miscellaneous Discrete Cables	
		LAN (Local Area Network) Cables	
		DS3/EC1 Ribbon Cables	
		Fiber Cables	

Part IB: WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Stand Alone Installation Test

Stand Alone Installation Test Introduction

Contains power up, circuit pack installation, CIT installation, loading and booting software onto the NE, provisioning of the system, testing of the entire system as a stand-alone.

Contents

This part of the document contains the following chapters.

Stand Alone Installation Test Entry Checklist

Entry Checklist The following provides a checklist to be completed prior to performing the stand alone installation tests. Verify that each procedure has been completed, check off, and initial the item.

Completed	Initials	Item (Procedure)	Notes
		Physical and Power Installation Exit Checklist	

Powering, Circuit Pack Installation, and Software Installation

4

Contents

Background

Introduction   This chapter provides information to apply power, install circuit packs, and install the initial software load for the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelves.

Objectives   This chapter provides information to perform the following:

1.   Power the 2.5G and 10G shelves.

2.   Install circuit packs in the 2.5G and 10G shelves.

3.   Install WaveStar™ CIT and 2.5G/10G Network Element software application.

Related tasks   For related tasks, refer to the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Software Release Description.

Tools, Test Sets, and Accessories

**Required
Equipment**

The following equipment is required to complete the procedures in this section:

- Multimeter capable of measuring resistance (ohms) and DC volts from -40 to -60 volts

- Wrist strap connected to the wrist strap ground jack of the user panel for electrostatic discharge (ESD) protection

- Personal computer for use as craft interface terminal (CIT), see requirements in Chapter 1

- Straight 10BaseT ethernet cable for connecting PC to WaveStar™ TDM2.5/10G system

Powering

Overview

The WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelves use a distributed power system, rather than bulk power supplies. Each shelf has an A and B power feeder which distribute -48 V power throughout the shelf, and each circuit pack uses its own onboard power converter to derive the necessary operating voltages.

Dual Power Feeds

Office power feeders A and B are filtered and protected by circuit breakers at the input shelf. The two -48 V supplies are then distributed separately to each circuit pack, where they are filtered and fused before being converted to the circuit pack working voltages.

Circuit Breakers

The -48 V circuit breakers have self-indicating rocker switches. The normally hidden portion of the rocker switch is red. When the breaker is tripped, the red portion is exposed, providing a visual indication. The breaker can be tripped manually by inserting a small screwdriver blade (or equivalent) into the slot on the rocker switch. This feature will reduce the risk of accidental loss of power.

Power Indicator

The green PWR ON indicator on the user panel of each shelf remains lighted as long as either of the two -48 V feeds are received from the circuit breakers.

⚠ **DANGER:**
Use caution when handling power leads. The red power lead connects to -48 V DC source. The white power lead connects to battery return.

Powering (Continued)

Powering Procedure   **Table 4-1.**   **The following procedure describes how to power a 2.5G and 10G shelf.**

Step	Action
1	Verify all packing material has been removed from each shelf (2.5G and 10G, if applicable).
2	Verify the following: • Circuit breakers at the Battery Distribution and Fuse Bay (BDFB) are in the **OFF** position, or • Fuses on the BDFB are **not installed.**
3	If any circuit packs are installed in the shelf, unseat all circuit packs from each shelf (10G and 2.5G).
4	Verify the circuit breakers on each 2.5G and 10G shelf are in the **OFF** position.
5	Insert one 30 amp fuse for Load A and one for Load B into the BDFB for each 2.5G and 10G shelf. If circuit breakers are being used, put both of them in the **ON** position.
6	Using a volt/ohm meter verify the voltage at the connectorized end of each power cable. **Requirement:** The voltage should be -48 volts (between -41.75 and -60 V DC) at each cable connector.
7		**If the voltage requirement...**	**then**
	is met for each power cable,	proceed to Step 8.
	is not met,	proceed to Chapter 10, Installation Troubleshooting.
8	Remove the 30 amp fuses for Load A and Load B for each shelf from the BDFB. If circuit breakers are being used, put both of them in the **OFF** position.
9	Connect the power feeders to the correct locations on each 2.5G and 10G shelf.
10	Re-insert the 30 amp fuses for Load A and Load B for each shelf into the BDFB. If circuit breakers are being used, put both of them in the **ON** position.
11	Operate the circuit breaker labeled Load A on the shelf to the **ON** position. **Requirement:** The PWR ON LED is illuminated on the user panel of the shelf. The PWR ON and FAIL LED are illuminated on the fan shelf.
	Continued on next page

Step	Action
12	Operate the circuit breaker labeled Load A on the shelf to the **OFF** position. **Requirement:** The PWR ON LED is extinguished on both the user panel of the shelf and the fan shelf.
13	Repeat steps 11 and 12 for Load B.
14	Operate both circuit breakers on the shelf to the **ON** position. **Requirement:** The PWR ON LED is illuminated on the user panel of the shelf. The PWR ON LED is illuminated on the fan shelf.
15	Repeat steps 1-14 for each 2.5G and 10G shelf.
16	Continue with the "Circuit Pack Installation Procedure" procedure.
17	**Stop! End of Task.**

Circuit Pack Installation

Circuit Pack Installation

Table 4-2.   Follow the procedure below to install the 2.5G and 10G circuit packs.

* NOTE 1: Circuit pack code may be followed by "AE" or "BE", e.g. LEY3AE or LLY2BE, which indicates NEBS Level 3 compliance.

** NOTE 2: The LEY10B circuit pack installed in the 10G shelf does not use a Flashdisk. The Flashdisk slot on this circuit pack will remain empty.

Step	Action
1	If installing a 10G (2-Fiber) shelf, refer to Figure 4-2 to install the following circuit packs. Otherwise, go to Step 2:

⚠ **CAUTION:**
To avoid damaging circuit pack components located on the solder side of the circuit board, use extreme caution when installing circuit packs, especially "AE" coded packs for NEBS Level 3 open-door compliance. Make sure to slide each circuit pack straight into its slot and slightly away from the adjacent circuit pack.

⚠ **CAUTION:**
The use of an ESD approved wrist strap is required when handling any WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) circuit pack.

⇒ **NOTE:**
When installing the TMG packs, use BOTH hands: one to hold the latch, the other to apply force to the bottom of the pack. This allows the circuit pack to slide into the slot more easily.

10G Circuit Pack* (*See NOTE 1)	10G Slot
OC192/1.55 (e.g. LEY67,69,97,etc.)	OC192/STM64/W
PPROC/STS192 (LEY 3)	PPROC W
SWITCH/STS576 (LEY 4) or SWITCH/STS768 (LEY73) if using shelves 3 and 4.	SWITCH0
PPROC/STS192 (LEY 3) or PPROC/STS384 (LEY47) if using shelves 3 and 4.	PPROC0
CTL/SYS50DM (LEY10B)**	CTL SYSDM0** (see NOTE 2)
ADJCTL/DCCEI (LEY 1)	DCCEI
TMG/STRAT3 (LLY 2 or LLY 2B)	TMG0 (lower slot) [see NOTE above]
TMG/STRAT3 (LLY 2 or LLY 2B)	TMG1 (upper slot) [see NOTE above]
PPROC/STS192 (LEY 3) or PPROC/STS384 (LEY47) if using shelves 3 and 4.	PPROC1
SWITCH/STS576 (LEY 4) or SWITCH/STS768 (LEY73) if using shelves 3 and 4.	SWITCH1
PPROC/STS192 (LEY 3)	PPROC E
OC192/1.55 (e.g. LEY67,69,97,etc.)	OC192/STM64/E

Step	Action
2	Refer to Figure 4-1 to install the following circuit packs in each 2.5G shelf. Make sure to observe the CAUTIONS and NOTE from step 1. ⇒ **NOTE:** The minimum circuit pack equipage for the 2.5G shelf is indicated in Table 4-3.

2.5G Circuit Pack * (*See NOTE 1 at end of this table.)	**2.5G Slot**
ADJCTL/DCCEI (LEY 1)	DCCEI
SWITCH/STS576 (LEY 4)	SWITCH0
SWITCH/STS576 (LEY 4)	SWITCH1
TMG/STRAT3 (LLY 2 or LLY 2B)	TMG0 (lower slot) [see NOTE in step 1]
TMG/STRAT3 (LLY 2 or LLY 2B)	TMG1 (upper slot) [see NOTE in step 1]
If:	**then:**
DS3/EC1 protection is required,	proceed to Step 3.
DS3/EC1 protection is **not** required,	proceed to Step 5.

Step	Action
3	Unpack and insert a **SWITCH/DS3EC1 (LEY 18)** circuit pack into the slot labeled **EPROTSW**. (If required)
4	Unpack and insert a **DS3EC1/8 (LEY 17)** circuit pack into the slot labeled **EPRN**. (If required)
5	Unpack and insert port units (DS3/EC1 [LEY17], OC3/STM1 [e.g. LEY16], OC12/STM4 [e.g. LEY13], OC48/STM16 [e.g. LEY7, 8, etc.], GigE [e.g. LEY309]) into slots 1-16 as required per work order. The following restrictions apply to port unit slots: • If DS3/EC1 1XN protection packs are being used (see step 3 above), slot 16 must either contain a DS3EC1/8 or else be empty. • DS3/EC1 circuit packs cannot be installed in slots 7, 8, 9, and 10. • OC48/STM16 port units occupy two slots: odd on the left and even on the right. The port unit is known by its even-numbered slot. • GigE port units occupy two slots: odd on the left and even on the right. The port unit is known by its even-numbered slot. • OC48/STM16 circuit packs that are East/West in a BLSR must be in adjacent slots in the same quadrant, or symmetric slots with one on each side of the shelf. Specifically, the only acceptable combinations are: 2&4, 6&8, 10&12, 14&16, 2&16, 4&14, 6&12, or 8&10.
	Continued on next page

Step	Action	
6	Unpack the **CTL/SYS50DM (LEY10B)** circuit pack.	
7	If installing the LEY10B into a standalone 2.5G shelf, or into the first (main) 2.5G shelf of a 10G system,	Slide the LEY10B into the slot labeled **CTLSYSDM0,** but leave it **unseated.** The slot labeled CTLSYSDM1 will remain empty.
	If installing the LEY10B into the second 2.5G shelf of a 10G system,	Insert the LEY10B into the slot labeled **CTLSYSDM0.** The slot labeled CTLSYSDM1 will remain empty. The will be no flashcard in these shelves.
8	Note that the LEDs on most of the circuit packs in the 2.5G and 10G shelves will blink until the software is downloaded in the next procedure.	
9	In all empty slots, install a blank faceplate. For proper operation of the system, every slot should contain either a circuit pack or a blank faceplate. Refer to Table 4-4 for the correct slot locations of the blank faceplates.	
10	Continue with the next procedure, "Software Installation".	
11	**Stop! End of Task.**	

Circuit Pack Installation (Continued)

2.5G Circuit Pack Locations

Port Unit 1	Port Unit 2	Port Unit 3	Port Unit 4	Port Unit 5	Port Unit 6	Port Unit 7	Port Unit 8	DS3EC1/8	SWITCH/DS3EC1	SWITCH/STS576 (0)	CTL/SYS50DM (0)	ADJCTL/DCCEI	BLANK	SWITCH/STS576 (1)	TMG (0) / TMG (1)	Port Unit 9	Port Unit 10	Port Unit 11	Port Unit 12	Port Unit 13	Port Unit 14	Port Unit 15	Port Unit 16

Figure 4-1. The diagram above indicates the proper circuit pack equipage for the 2.5G shelf.

10G Circuit Pack Locations

Reserved	OBA/OBPA	OC192/STM64 (W)	PPROC STS192 (W)	SWITCH/STS576/768 (0)	PPROCSTS192/384(0)	CTL/SYS50DM (0)	ADJCTL/DCCEI	BLANK	BLANK	TMG (0) / TMG (1)	PPROC STS192/384 (1)	SWITCH/STS576/768 (1)	PPROC STS192 (E)	OC192/STM64 (E)	OAT/R (E)	Reserved

Figure 4-2. The diagram above indicates the proper circuit pack equipage for the 10G shelf.

Circuit Pack Installation (Continued)

Minimum Required Circuit Packs for 2.5G (OC-48)

Table 4-3. The table below lists the minimum required circuit packs to turn-up a WaveStar™ TDM 2.5G shelf.

Circuit Pack	Quantity	Comcode
ADJCTL/DCCEI (LEY1)	1	107914822
SWITCH/STS576 (LEY4)	2	107855116
CTL/SYS50DM (LEY10B)	1	107978017
TMG/STRAT3 (LLY2 or 2B)	2	107855181

Locations of Blank Faceplates

Table 4-4. The table below shows the proper locations of the blank faceplates. Each blank faceplate is stamped with the last 4 digits of the appropriate Comcode.

Shelf	Slot	Blank Faceplate Comcode Non-NEB3 Shelf[a]	Blank Faceplate Comcode NEB3 Shelf[b]
2.5G	1 - 8	848294690	848514451
	9 - 16		
	EPRN		
	EPROTSW	848295093	848514485
	CTL/SYS50DM 1	848294799	848514501
10G	Far left and far right	848294799	848514501
	CTL/SYS50DM		
	OC192 (requires 2 blanks)		
	OA	848295093	848514485
	DCC	848294690	848514451

a. Non-NEB3 shelves: ED8C789-30 G2 (2.5G), and ED8C789-31 G1 (10G)

b. NEB3 shelves: ED8C789-30 G2E (2.5G), and ED8C789-31 G1E (10G)

Software Installation

Software Installation Procedure

Installation of the WaveStar™ 2.5G/10G software and WaveStar™ CIT software is covered in detail in the WaveStar™ 2.5G/10G Software Release Description (SRD), which was provided with the software CD. To install the NE and CIT software, please follow the procedures in the "New Installation" chapter of the SRD, with the following additional considerations:

- During Flashdisk Card Installation:

    a. Follow the procedure in the SRD to load the Flashdisk with the Network Element software. Make sure the NE software is on the Flashdisk prior to inserting the Flashdisk into the NE.

    b. Refer to Figure 4-3 for proper insertion of the Flashdisk card. The card's main label faces left. The edge connector end is inserted first.

    c. For a standalone 2.5G shelf: Insert the **Flashdisk** card (loaded with NE software) into the *unseated* **CTL/SYS50DM (LEY10B)** circuit pack.

    d. For a 10G system: Insert the **Flashdisk** card into the *unseated* **CTL/ SYS50DM (LEY10B)** circuit pack of the **<u>FIRST</u>** 2.5G shelf **<u>only</u>**. (This is the main controller shelf of the 10G system.) The CTL/SYS50DM circuit packs in the 10G shelf and in any additional 2.5G shelves do **not** have a Flashdisk card installed.

    e. Refer to the User Operations Guide to remove the Flashdisk card from the CTL/SYS50DM circuit pack, if necessary.

- Make sure to complete all procedures in the "New Installation" chapter of the SRD.

Software Installation (Continued)

Flashdisk Insertion

Figure 4-3.   The figure above illustrates the proper position of the flashdisk for insertion.

$\Rightarrow$ **NOTE:**
There is a groove at the top of the Flashdisk shaped like a "U" This should go facing up, the groove shaped as an "L" is facing down.

Required Provisioning

5

Contents

Background

Introduction   This chapter describes how to provision each Network Element (WaveStar™ 2.5G or
                       10G) in a ring so that ring installation can be completed.

Objectives   This chapter provides information to perform the following:

1. How to Login/Logout

2. Provisioning target identifier (TID)

3. Provisioning timing mode

4. Provision time and date

**Related tasks and   For related tasks and information, refer to the appropriate 2.5G/10G User Operations
information**   Guides (UOG) and Alarm Messages and Trouble Clearing Guides (AMTCG).

How to Login and Logout of the Network Element Using the CIT GUI

Logging In to the CIT and NE

Many procedures throughout this document require the user to login to the CIT GUI and NE (2.5G or 10G Network Element). *For the correct first-time login procedure, refer to the Software Release Description (SRD) document provided with the NE & CIT software CD.* After completing this procedure, the Standard Login Procedure provided below can be used to login to the Network Element.

Standard Login Procedure (NOT for first-time login)

Table 5-1. **The following steps are used to connect to the Network Element using the CIT GUI. If logging in for the first time, use the login procedure provided in the "New Installation" chapter of the Software Release Description.**

Step	Action
1	Double click on the **WaveStar™ CIT** icon.
2	Enter User ID: **LUC01** and valid CIT password**.**
3	Click **OK** if you agree to the legal notice.
4	Follow the on-screen instructions, filling in the appropriate fields, including TID, and click "Connect".
5	If the Login window is displayed, enter User ID: **LUC01** and valid NE password**.**
6	Click **OK** if you agree to the legal notice. **EXPECTED RESULT:** The NE's System View or Shelf View is displayed.
7	**Stop! End of Task.**

How to Login and Logout of the Network Element Using the CIT GUI (Continued)

Logging Out of the CIT and NE

Table 5-2. **The following steps are used to disconnect from the Network Element and the CIT GUI. This does not need to be done at this time. It is provided for reference purposes.**

Step	Action
1	To logout of the Network Element, in the NE's System View or Shelf View window, click **File-->NE Disconnect**.
2	Click **Yes** to execute logoff of the Network Element. **EXPECTED RESULT:** The NE window closes. The WaveStar™ CIT window remains open.
3	To logout of the WaveStar™ CIT, in the CIT window, click **File-->Exit**.
4	Click **Yes** to Logoff WaveStar™ CIT.
5	**Stop! End of Task.**

Provision TID of Network Element

Procedure to Provision TID

Table 5-3.   **Follow the steps below to provision the TID.**

Step	Action	
1	**If:**	**Then:**
	the TID has already been changed from the default TID of lucent-wavestar-ne (this procedure is in the Software Release Description),	skip this procedure and continue with the next procedure, "Provisioning System Timing".
	the TID has *not* already been provisioned,	follow the steps below to provision the TID.
2	If more than one Network Element is connected to the WaveStar™ CIT via a hub, disconnect all LAN cables from the NEs except for the NE whose TID is being changed.	
3	Connect to the NE using the CIT using the procedure on page 5-3, with the default TID "**lucent-wavestar-ne**".	
4	Choose **Fault-->Enter/Exit Maintenance Condition**. If "Enter Maintenance Condition" is grayed out, continue to next step. Otherwise, select "Enter Maintenance Condition" and click appropriate responses until shelf view is displayed and the word "Maintenance" is displayed in the box on the bottom of the screen to the left of the date and time.	
5	Choose **Administration**-->**Set TID** from the CIT.	
6	Enter the "New TID/NE Name" and the "Confirm TID/NE Name." Click **OK**. Note that the new TID will not take effect until you exit Maintenance Condition.	
7	At the CIT, in the NE's system view, click **Configuration-->Provision**	
8	Click on **WaveStar™ 2F 2.5G/10G**.	
9	Click **Provision**.	
10	Select the Tributary Mode, either adaptive or fixed. If unsure, select adaptive.	
11	Click **Apply**.	
12	Click **Yes**. Click **Close**.	
13	**Stop! End of Task.**	

Provisioning System Timing

Timing Description   This section provides a procedure for setting up the system timing in the shelf. The specific settings to choose should be based on office records.

Procedure to Provision System Timing

Table 5-4.   The NE's default system timing is free-running. Follow the steps outlined below to change the 2.5G or 10G system timing from free-running to external, line, etc.:

Step	Action	
1	Login to the NE using the WaveStar™ CIT using the procedure in Table 5-1.	
2	From the CIT, choose **Configuration-->Timing/Sync**.	
3	**If:**	**Then:**
	Using an external timing source, e.g. BITS clock:	Proceed to step 4
	Using line timing (OC48 or OC192):	Proceed to step 17
4	Select the "**External Timing Input Ports**" tab.	
5	Select the "**External Timing Port AID**": EXTTMG0 and EXTTMG1 refer to the timing input ports J36 and J42 on the backplane.	
6	Select the appropriate timing format, either "**ESF**" or "**SF**" depending on the format of the external timing signal. (The LLY2B or LLY2BE TMG circuit pack is required for "SF".)	
7	Select "**Apply to:**" either "**This Timing Port**" or "**Both exttmg0 and exttmg1**" depending on desired result.	
8	Click "**Apply**".	
9	Select the "**Timing Reference**" tab.	
10	**For:**	**Select:**
	Timing Reference:Port AID	"EXTREF1" "EXTTMG0" (if an external timing signal is connected to this timing input port).
	System Timing Reference Priority:	1, 2, 3, or 4 depending on desired result. (1 is highest priority, 4 is lowest.)
	QL Provisioned (if applicable):	The desired quality level value.
		Continued on next page

Step	Action
11	Click "**Apply**".
12	Repeat previous two steps if two external timing input ports are being used, selecting "**EXTREF2**" and "**EXTTMG1**" instead.
13	Select the "**System Timing**" tab.
14	**For:** **Select:** Provisioned Clock Mode: Locked System SSM Mode: Desired Sync Messaging mode (if applicable) Timing Reference Wait to Restore: Desired value
15	Click "**Apply**".
16	If provisioning the External Timing Output ports to use the NE as a timing source, proceed to step 24. Otherwise, skip remaining steps and continue with "Procedure to Disable Password Aging".
17	To provision Line timing, select the "**Timing Reference**" tab.
18	**For:** **Select:** Timing Reference: Line 1 Port AID: The appropriate OC-48 or OC-192 port, or click "**Browse**" and make selection System Timing Reference Priority: Desired value 1, 2, 3, or 4 QL Provisioned: Desired quality level value
19	Click "**Apply**". NOTE: Any additional references should that are to be used should be provisioned at this time using Step 18.
20	Select "**System Timing**" tab.
21	**For:** **Select:** Provisioned Clock Mode: Locked System SSM Mode: Desired Sync Messaging mode (if applicable) Timing Reference Wait to Restore: Desired value
22	Click "**Apply**".
23	If provisioning the External Timing Output ports to use the NE as a timing source, proceed to next step. Otherwise, skip remaining steps and continue with "Procedure to Disable Password Aging.
24	Select the "**External Timing Output Ports**".
	Continued on next page

Step	Action	
25	**For:** External Timing Output Port AID: Timing Output Format: Remaining provisionable parameters displayed on screen: Apply to:	**Select:** EXTTMG0_Out SF or ESF depending on desired result Desired values This timing port or both exttmg0_out and exttmg1_out, whichever is applicable.
26	Click "**Apply**".	
27	If necessary, repeat previous two steps for EXTTMG1_Out with the appropriate parameter values.	
28	Continue with "Procedure to Disable Password Aging".	
29	**Stop! End of Task.**	

Disable Password Aging

Description   This procedure disables password aging.

Procedure to   **Table 5-5.   Follow the steps in the table below.**
Disable Password
Aging

Step	Action
1	Login to the NE using the WaveStar™ CIT using the procedure in Table 5-1.
2	At the CIT, in the NE's system view, click **Administration-->Security-->User Provisioning**
3	Click the **Existing User** radio button and select **LUC01** from the drop down menu**.**
4	Click the **Disable** radio button in the **Password Aging Interval** box.
5	Click **Modify**.
6	Repeat steps 2 - 5 for **LUC02**.
7	Continue with the "Procedure to Set System Time & Date"

Set System Time and Date

Description

This procedure sets the system date and time.

**Procedure to Set
System Time and
Date**

Table 5-6.   **Follow the steps in the table below.**

Step	Action
1	Login to the NE using the WaveStar™ CIT using the procedure in Table 5-1.
2	At the CIT, in the NE's system view, click **Configuration-->Provision**
3	Click on **WaveStar™ 2F 2.5G/10G**.
4	Click **Provision**.
5	Select the correct month, day, year, hour, minute, and a.m. or p.m.
6	Click **Apply**.
7	Click **Yes**.
8	Click **Close**.
9	To logout of the NE and CIT, use the procedure in Table 5-2. Or continue with "Shelf Testing", Chapter 6.
	Stop! End of Task.

Final Operations

After completing this chapter, the basic required provisioning of the Network Element has been completed. Continue with the next chapter, "Shelf Testing".

Shelf Testing

6

Contents

Background

Introduction   This chapter provides basic Network Element tests.

Objectives   This chapter provides information to perform the following:

1.   Add the 10G shelf and second 2.5G shelf using the WaveStar CIT.

2.   Test the LEDs on circuit packs and user panel.

3.   Test the office alarms.

4.   Test the port units and cabling.

5.   Test the redundancy of the SWITCH and PPROC circuit packs.

6.   Test the optical output power of the optical port units.

7.   Test for DS3/EC1 cable in/out reversal.

8.   Test the backplane cabling of the 10G system.

Related tasks and information   For related tasks and information, refer to the appropriate 2.5G/10G User Operations Guides (UOG) and Alarm Messages and Trouble Guides (AMTCG).

Testing Setup

**General
Considerations**

⚠ **CAUTION:**
Installation Cable Tests should be performed on out-of-service equipment only.

⚠ **WARNING:**
Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.

**Tools, Test Sets and
Accessories**

Following is a list of equipment required to complete the testing of the Network Element.

- Minimum of two optical fiber cables with appropriate connectors

- Optical attenuators (minimum of 10dB-15dB)

- Minimum of two coax jumpers

- One personal computer (PC) with WaveStar™ CIT interface installed

- Standard twisted pair ethernet cable

- Bit Error Rate Test Set to transmit and receive a standard DS3/EC1 signal

- OHMmeter to test 10G backplane cabling

Adding the 10G and Additional 2.5G Shelves

Description

In the previous sections, all shelves were installed, powered, and cabled together, and the first 2.5G shelf was brought up. If installing a standalone 2.5G shelf, continue with the "LED Test" procedure. If installing a 10G system, this section provides the procedure to add the 10G and additional 2.5G shelves to complete the 10G system.

Procedure to Add 10G and Additional 2.5G Shelves

Table 6-1. **Complete the following steps to add the 10G and second 2.5G shelves. If installing a standalone 2.5G shelf, skip this procedure and continue with the "LED Test" procedure.**

Step	Action
1	Login to the Network Element from the WaveStar™ CIT using the Standard Login Procedure in Chapter 5.
2	Select **Configuration**-->**Create New**-->**Shelf**.
3	At left side of window, click on **Bay 1** to highlight it, then click on **Select I/O Bay** at the bottom of the window.
4	**For:** **Select:** Shelf AID: 1 - 2 Shelf Type: 10G I/O ON Cable Identifier: 1 (Refer to Figure 6-1 for physical ON Cable assignment) SSBit Override: Desired value: Enabled is 00, Disabled is 01 Alarm Severity Assignment Profile: Desired value
5	Click the **Apply** button. Wait for the **Apply** button to become grayed-out.
6	**If a second 2.5G shelf:** **Then:** is installed: proceed to Step 7. is not installed: proceed to Step 15.
7	**For:** **Select:** Shelf Type: 2.5G I/O Shelf AID: 1 - 3 ON Cable Identifier: 2 if using Option1, 3 if using option 2.(Refer to Figure 6-1 for physical ON Cable assignment) SSBit Override: Desired Value Alarm Severity Assignment Profile: Desired value
	Continued on next page

Step	Action	
8	Click the **Apply** button. Click **Yes** to confirm. Then wait for the **Apply** button to become grayed-out.	
9	**If a third 2.5G shelf:**	**Then:**
	is installed:	proceed to Step 10.
	is not installed:	proceed to Step 15.
10	Create new bay by selecting **Configuration--Create New--Bay,** the bay Access Identifier is 2. Click **Okay.**	
11	**For:**	**Select:**
	Shelf Type:	2.5G I/O
	Shelf AID:	2 - 1
	ON Cable Identifier:	3 if using Option 1, 2 if using Option 2.(Refer to Figure 6-1 for physical ON Cable assignment)
	SSBit Override	Desired value
	Alarm Severity Assignment Profile:	Desired value
12	Click the **Apply** button. Click **Yes** to confirm. Then wait for the **Apply** button to become grayed-out.	
13	**If a fourth 2.5G shelf:**	**Then:**
	is installed:	proceed to Step 13.
	is not installed:	proceed to Step 15.
14	**For:**	**Select:**
	Shelf Type:	2.5G I/O
	Shelf AID:	2 - 2
	ON Cable Identifier:	4 (Refer to Figure 6-1 for physical ON Cable assignment)
	SSBit Override	Desired value
	Alarm Severity Assignment Profile:	Desired value
15	Click the **Apply** button. Click **Yes** to confirm. Then wait for the **Apply** button to become grayed-out.	
16	Click the **Close** button at the bottom of the window.	
17	Wait until the 10G and additional 2.5G shelves boot (all LEDs stop blinking and only green LEDs are illuminated). Then, from the CIT menu bar, select **View-->System View Display**. **Expected Result:** The bay and all installed shelves are displayed.	
18	Continue with "LED Test" procedure.	
19	**Stop! End of Task.**	

Part of Rear View of First 2.5G Shelf Backplane

P404	**P402**	**P400**	**P398**	**P403**	**P401**	**P399**	**P397**
ON 4	ON 3	ON 2	ON 1	ON 4	ON 3	ON 2	ON 1

ON 1 connectors are for ED8C789-21 G30 cables to 10G Shelf.

ON 2 ON3 and ON4 connectors are for ED8C789-21 G30 cables to second, third and fourth 2.5G Shelves respectively.

Figure 6-1.   External ON Cable Assignments

LED Test

**LED Test
Description**

The LED test verifies proper operation of LEDs in each shelf. If failed LEDs are indicated, replace the circuit pack or module in the slot. Repeat test until all LEDs are working properly. If an LED works in one slot, it will work in any slot, so there is no need to move circuit packs to unequipped slots. The LED test can be done using hardware or software. The procedure below provides both tests.

LED Test Procedure   Table 6-2.   **Perform the following procedure to test the LEDs in each shelf.**

Step	Action
1 -	Login to the NE with the WaveStar™ CIT using the Standard Login Procedure in Chapter 5.
2	Select **Fault-->Test-->LED** from the menu bar.
3	Enter the AID in the box provided, or click the shelf. Example: Bay 1, Shelf 1 has an AID of 1-1. The AID will appear in the "Enter AID" text box.
4	Click **Select**. Another Test LED window will appear requesting the number of iterations.
5	Verify the Shelf AID, and number of iterations. A suggested number of iterations is 2. Click on the arrow and select the number of iterations.
6	Click **Start**, then click **Yes**. **EXPECTED RESULT:** All LEDs on the user panel turn on for 3 seconds, then off for 3 seconds. This repeats 3 times for each iteration chosen. Then all LEDs on the circuit packs turn on for 3 seconds, then off for 3 seconds. This also repeats 3 times for each iteration chosen. The "Test Status" will indicate Test Successful.
7	Locate and press the LED test button on the user interface panel. **EXPECTED RESULT:** All LEDs on the user panel turn on for 3 seconds, then off for 3 seconds. This repeats three times. Then all LEDs on the circuit packs turn on for 3 seconds, then off for 3 seconds. This repeats three times.
8	Repeat above steps for each shelf (2.5G and 10G, if applicable).
9	Continue with "Alarm Test" procedure.
10	**Stop! End of Task.**

Alarm Test

Alarm Test Description

The alarm test verifies the connection of the alarming equipment, including external office alarm equipment.

Alarm Test Procedure

Table 6-3.   Follow the steps in the table to complete the alarm test.

Step	Action
1	Login to the NE with the WaveStar™ CIT using the Standard Login Procedure in Chapter 5.
2	If necessary, notify alarm monitoring personnel that this test will be performed.
3	Select **Fault-->Test-->Office Alarm** from the menu bar. A **Test Office Alarm** window will appear.
4	Enter the AID in the box provided, or click the shelf. Example: Bay 1, Shelf 1 has an AID of 1-1, as shown in the "Enter AID" text box.
5	Click **Select**. Another **Test Office Alarm** window will appear requesting the number of iterations.
6	Verify the Shelf AID, and number of iterations. A suggested number of iterations is 2. Click on the arrow and select the correct number of iterations.
7	Click **Start**, then click **Yes**. **EXPECTED RESULT:** The office alarms connected to the shelf turn on for five seconds in the following order: Critical, Major, Minor. All office alarms connected to the shelf follow the sequence. This includes any external office equipment that is connected. This sequence will repeat for the number of iterations. The "Test Status" will indicate Test Successful.
8	Repeat above steps for each shelf (2.5G and 10G, if applicable).
9	Continue with the "Port Unit and Cabling Test" procedure.
10	**Stop! End of Task.**

Port Unit and Cabling Test

Port Unit and Cabling Test Description

This test verifies the functionality of the port units and the DS3/EC1 connector panels associated with each 2.5G shelf.

Required Test Equipment

DS3/EC1 Test Set, coax jumper cables, and DS3/EC1 port units.

Port Unit and Cabling Test Procedure

Table 6-4.   Follow the steps in the table to perform the port cabling test.

Step	Action
1	Login to the NE from the WaveStar™ CIT using the Standard Login Procedure in Chapter 5.
2	In order to test all slots, the electrical port units may have to be moved and the test run again, unless a full complement of circuit packs is available. Make sure the electrical and optical port units have been installed in the appropriate slots. If only one DS3/EC1 connector panel is installed, then electrical port units will only be permitted in the slots corresponding to the connector panel. For example, the DS3/EC1 port units are installed in slots 1-6 if the DS3/EC1 connector panel: • is mounted on the on the left side of the 2.5G shelf as viewed from front of equipment, or • is mounted below the shelf, or • is rear-mounted and is on the right side of the 2.5G shelf as viewed from the back of the equipment. The DS3/EC1 units are installed in slots 11-16 if the DS3/EC1 connector panel: • is mounted on the on the right side of the 2.5G shelf as viewed from front of equipment, or • is mounted above the shelf, or • is rear-mounted and is on the left side of the 2.5G shelf as viewed from the back of the equipment.
	Continued on next page

Step	Action
3	For the port units installed, perform cross-connect loopbacks to all ports and tribs by selecting: **Fault-->Analysis-->Cross-Connect Loopback**. Select the shelf, slot, port and trib, and operate a loopback. **EXPECTED RESULT:** The ABN LED is illuminated.
4	For each electrical port unit installed, connect the output of the test set to an IN port at the cross-connect panel and connect the input of the test set to the OUT port. **EXPECTED RESULT:** Error free transmission.
5	Perform a manual protection switch. At the CIT, choose **Fault-->Protection Switch**. Click on the "Ptn Grp" tab at the bottom. If necessary, expand the bay and shelf Click on the 1xN Equipment, then click on **Select**. Select the appropriate pack. For **Switch Type**, select **Manual**. Click **Apply**, then click Yes. Remove the port unit and verify the transmission is switched to the protection pack, if applicable. For DS3/EC1, only 1xN protection is applicable (not 1+1). **EXPECTED RESULT:** A minor alarm occurs. The test set may have experienced a hit, but the signal is still good.
6	Re-insert the port unit. The port will switch back from protection after the wait-to-restore time period (system WTR default is 5 minutes).
7	Select: **Fault-->Analysis-->Cross-Connect Loopback**. Select the slot, port, and trib, and release the loopback. **EXPECTED RESULT:** The ABN LED extinguishes.
8	Repeat steps 3 through 7 for each port on the port unit.
9	If all slots have not been tested, remove all port units, and insert the DS3/EC1 cards in any applicable slots that have not been tested with a DS3/EC1 port unit. Repeat steps 2-8 for each slot that has not been previously tested.
10	Verify the ABN LED is extinguished on the User Panel. If it is illuminated, a cross-connect loopback still exists and must be released.
	Continued on next page

Step	Action
11	To clear any minor (MN) Loss of Signal (LOS) alarms that may be raised on the remaining ports: Right click on the blue LED representing the alarmed port. Select **Provision Port x** (where x is the port number). Change **Port Mode** from **Monitored** to **Auto**. Click **OK**, then click **Yes**.
12	Continue with the "SWITCH and PPROC Redundancy Test".
13	**Stop! End of Task.**

SWITCH and PPROC Redundancy Test

Introduction   The Switch circuit packs (STS576) and associated PPROC circuit packs (the PPROCs are in 10G shelf only, in slots PPROC0 and PPROC1) are protected pairs. Of the Switch0 and Switch1 circuit packs in the 2.5G and 10G shelves, one is active and one is standby. The same applies to PPROC0 and PPROC1 in the 10G shelf. The test below verifies that the standby circuit pack of the pair will become active when the active circuit pack fails.

Procedure to test the redundancy of the SWITCH and PPROC pairs

Table 6-5. Follow the steps in the table to verify the redundancy of the SWITCH0/SWITCH1 and PPROC0/PPROC1 circuit packs.

Step	Action	
1	At the WaveStar CIT, connect to the first Network Element.	
2	**If:**	**Then:**
	testing a standalone 2.5G shelf,	go to step 3.
	testing a 10G system,	double click on the main 2.5G shelf.
3	From the shelf view of the 2.5G shelf, determine which SWITCH STS576 circuit pack is Active (indicated by the (A) on the faceplate) and which is Standby (indicated by the (S) on the faceplate).	
4	Perform a manual switch from the Active SWITCH STS576 circuit pack to the Standby. Right Click on the switch card, Protection Switch--> Manual to Side 0 (Or 1, depending on the active pack) **Expected Result:** The previously Standby SWITCH STS576 circuit pack becomes Active and the NE indicates a Minor Alarm due to the Unequipped SWITCH STS576 pack.	
5	Clear the manual switch. Right Click on the switch card, Protection Switch--> Clear **Expected Result:** After less than 1 minute, this SWITCH pack becomes Standby and the alarm clears.	

Step	Action	
6	**If:**	**Then:**
	testing a standalone 2.5G shelf,	**Stop! End of Task.**
	testing a 10G system with a second 2.5G shelf,	obtain the shelf view of the second 2.5G shelf, then repeat steps 4 and 5 for the second 2.5G shelf.
7	At the WaveStar CIT, obtain the shelf view of the 10G shelf. Determine which SWITCH STS576 circuit pack is Active (indicated by the (A) on the faceplate) and which is Standby (indicated by the (S) on the faceplate).	
8	Repeat steps 4 and 5 for the SWITCH packs in the 10G shelf.	
9	Obtain the shelf view of the 10G shelf and determine which circuit pack, PPROC0 [ppls0] or PPROC1 [ppls1], is Active (indicated by the (A) on the faceplate) and which is Standby (indicated by the (S) on the faceplate).	
10	Perform a manual switch from the Active PPROC circuit pack to the Standby. Right Click on the switch card, Protection Switch--> Manual to Side 0 (Or 1, depending on the active pack) **Expected Result:** The previously Standby PPROC circuit pack becomes Active and the NE indicates a Minor Alarm due to the Unequipped PPROC pack.	
11	Clear the manual switch. Right Click on the switch card, Protection Switch--> Clear **Expected Result:** After 2-3 minutes, this PPROC pack becomes Standby and the alarm clears.	
12	Continue with the "Optical Output Power Test" procedure.	
13	**Stop! End of Task.**	

Optical Output Power Test

Optical Output Power Test Description

This test measures the optical output power of each optical port unit.

Optical Output Power Test

Table 6-6. **Follow the steps in the table to measure the optical output power of each optical port unit in the 2.5G and 10G shelf.**

Step	Action
1	Obtain an optical power meter and set it for the correct wavelength for the optical port unit being measured.
2	Connect a 0 dB LBO to the "OUT" port of the unit.
3	Using a 0 dB single mode fiber jumper between the LBO and the optical power meter, the measured output optical power should be in the range listed below:

Optical port unit:	**Output Power Range:**
OC192/STM64/1.5SR1	-4.0 to 2.0 dBm
OC192/STM64/1.5IRS1	0 to 2.0 dBm
OC192/STM64/1.5IR1	-1.0 to 2.0 dBm
OC192/STM64/WDM	See NOTE 1.
OC192/STM64/POU	-1.0 to 2.0 dBm
OC48/STM16/1.3LR1	-2.0 to 3.0 dBm
OC48/STM16/1.5LR1	-2.0 to 3.0 dBm
OC48/STM16/DWDM	See NOTE 1.
OC48/STM16/POU	-2.8 to 1.0 dBm
OC48/STM16/WDM	See NOTE 1.

Step	Action
4	Continue with the "DS3/EC1 Cable In and Out Reversal Test".
5	**Stop! End of Task.**

NOTE 1: These optical port units should be tested in conjunction with the WaveStar OLS system to which the port unit is connected. Tests are provided in the Installation Manual of the specific OLS product.

DS3/EC1 Cable In and Out Reversal Test

Cable In and Out Test

This test verifies that the DS3/EC1 input and output cables are not reversed.

Required Test Equipment

DS3/EC1 Test Set, coax jumper cables, and DS3/EC1 port units.

Procedure to Test for DS3/EC1 Cable In and Out Reversal

Table 6-7. **Follow the steps below for each DS3/EC1 connector panel at each 2.5G shelf to verify the input and output cabling. If the test does not pass, then the input and output cables are reversed.**

Step	Action
1	Insert DS3/EC1 port units into the appropriate slots.
2	Connect the output of the first DS3/EC1 port to the input of the test set.
3	Verify that an Idle signal is received.
4	Move the cable at the DS3/EC1 connector panel to the input and verify that no signal is received.
5	Repeat steps 2-4 for all ports.
6	Continue with the "10G Backplane Cabling Test".
7	**Stop! End of Task.**

10G Backplane Cabling Test

Introduction There are 14 interconnect cables between the 2.5G main tributary shelf and the 10G shelf. There are 6 interconnect cables between the 2.5G main tributary shelf and the second 2.5G shelf. There are also 8 interconnect cables between the second 2.5G shelf and the 10G shelf. Perform the following test to verify that these cables are correctly connected to their respective shelves.

Procedure to test 10G backplane cabling

Table 6-8.   Follow the steps below to verify the 10G backplane cabling.

Step	Action
1	Connect one lead of an OHMmeter to the backplane ground.
2	Starting with the first cable in Table 6-9, lift one end of the cable.
3	Connect the other lead of the OHMmeter to the end of the cable that was not lifted. **Expected Result:** If the cable is connected properly then the OHMmeter will indicate an OPEN. If the OHMmeter indicates a SHORT, make note of the cable and continue to the next step. There is a good chance that another cable will indicate a short as well. These cables are probably reversed and should be corrected before continuing with the next chapter.
4	Repeat the above steps for all cables listed in Table 6-9, Table 6-10, and Table 6-11.
5	**Stop! End of Task.**

10G Backplane Cabling Test (Continued)

Backplane cables from 10G to first 2.5G

Table 6-9.   Cables connecting the 10G shelf to the first 2.5G (main tributary) shelf.

ED8C789-21	Label at 10G end of cable	Label at first 2.5G end of cable
GR20	J7	J409
GR20	J8	J405
GR20	J9	J492
GR20	J10	J494
GR30	J5	J397
GR30	J6	J398
GR10	J12	J510
GR10	J16	J516
GR10	J36	J498
GR10	J40	J504
GR11	J21	J512
GR11	J25	J518
GR11	J29	J500
GR11	J33	J506

10G Backplane Cabling Test (Continued)

Backplane cables from 10G to second 2.5G

Table 6-10.   Cables connecting the 10G shelf to the second 2.5G shelf.

ED8C789-21	Label at 10G end of cable	Label at second 2.5G end of cable
GR10	J20	J512
GR10	J24	J518
GR10	J28	J500
GR10	J32	J506
GR11*	J13	J510
GR11*	J17	J516
GR11*	J37	J498
GR11*	J41	J504

Backplane cables from first 2.5G to second 2.5G

Table 6-11.   Cables connecting the first 2.5G shelf to the second 2.5G shelf.

ED8C789-21	Label at first 2.5G end of cable	Label at second 2.5G end of cable
GR20	J406	J491
GR20	J410	J490
GR20	J493	J496
GR20	J495	J497
GR30	J399	J395
GR30	J400	J396

Backplane cables from 10G to third 2.5G

Table 6-12.   Cables connecting the 10G shelf to the third 2.5G shelf.

ED8C789-21	Label at 10G end of cable	Label at third 2.5G end of cable
GR10	J14	J510
GR10	J18	J516
GR10	J38	J498
GR10	J42	J504
GR11	J23	J512
GR11	J27	J518
GR11	J31	J500
GR11	J35	J506

Backplane cables from first 2.5G to third 2.5G

Table 6-13.   Cables connecting the first 2.5G shelf to the third 2.5G shelf.

ED8C789-21	Label at first 2.5G end of cable	Label at third 2.5G end of cable
GR20	J407	J491
GR20	J488	J490
GR30	J401	J395
GR30	J402	J396

Backplane cables from 10G to fourth 2.5G

Table 6-14.   Cables connecting the 10G shelf to the fourth 2.5G shelf.

ED8C789-21	Label at 10G end of cable	Label at fourth 2.5G end of cable
GR10	J22	J512
GR10	J26	J518
GR10	J30	J500
GR10	J34	J506
GR11	J15	J510
GR11	J19	J516
GR11	J30	J498
GR11	J43	J504

Backplane cables from first 2.5G to fourth 2.5G

Table 6-15.   Cables connecting the first 2.5G shelf to the fourth 2.5G shelf.

ED8C789-21	Label at first 2.5G end of cable	Label at fourth 2.5G end of cable
GR20	J408	J491
GR20	J489	J490
GR403	J403	J395
GR30	J404	J396

Final Operations

After completing this chapter, the shelf testing has been completed verifying proper operation of LEDs, office alarms, and cabling. Continue with the next chapter, "Fiber Connection and Ring Setup".

Stand Alone Installation Test Exit Checklist

Exit Checklist The following provides a checklist to be completed after the completion of the stand alone installation test. Verify each item has been completed, check off and initial the item.

Completed	Initials	Item (Procedure)	Notes
		Powering	
		Circuit Pack Installation	
		Software Installation	
		Provision TID of Network Element	
		Provisioning System Timing	
		Disable Password Aging	
		Set System Time and Date	
		Adding the 10G and Second 2.5G Shelves	
		LED Test	
		Alarm Test	
		Port Unit and Cabling Test	
		SWITCH and PPROC Redundancy Test	
		Optical Output Power Test	
		DS3/EC1 Cable In and Out Reversal Test	
		10G Backplane Cabling Test	

Part 2: WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) Ring Testing

Ring Testing Introduction Contains instructions on how to complete installation and perform testing from the input to the output of the shelf in a Ring configuration

Contents This part of the document contains the following chapters.

Ring Testing Entry Checklist

Entry Checklist   The following provides a checklist to be completed prior to the Ring Testing. Verify that each procedure has been completed, check off, and initial the item

Completed	Initials	Item (Procedure)	Notes
		Stand Alone Installation Test Exit Checklist	

Fiber Connection and Ring Setup

7

Contents

Background

Introduction   This chapter describes how to establish optical fiber connections. This chapter provides procedures for directly connecting the WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelves. This chapter should be used for high-level ring connection.

Objectives   This chapter provides information on the following:

1.   Connection setup

2.   High-level ring connection

3.   Optical Jumpers and Line Build Outs

4.   OC-48 LBO Selection

5.   OC-192 LBO Selection

6.   Head-End TRMTR Optical power check

7.   Setup Far End Communications

8.   BLSR Protection Group Setup

Related tasks and information   For related tasks and information, refer to the appropriate 2.5G/10G User Operations Guides (UOG) and Alarm Messages and Trouble Clearing Guides (AMTCG).

Connection Setup

**General
Considerations**

⚠ **WARNING:**
Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.

• Disconnect the office alarms cable before performing any tests. Reconnect the office alarms cable after completing tests.

• Be sure each 2.5G and 10G shelf has completely passed all of the tests in the previous chapters of this document.

• Actual geographic East and West location of 2.5G and 10G shelves and offices may not reflect the chosen fiber assignments for the particular ring installation. Follow the fiber assignments given by maintenance engineering.

• A general familiarity with the WaveStar™ CIT GUI is assumed.

**Tools, Test Sets and
Accessories**

Required equipment is listed in Chapter 1 of this document. An optical power meter is needed to perform the steps in this section. The fiber connecting tool (C848439543) can be used to connect the fiber and LBO connectors.

High Level Ring Connection

Ring Fiber Connection Description

This section gives instructions for connecting fiber around the ring. If setting up a 2.5G OC-48 ring, use the "OC-48 Connection Procedure". If setting up a 10G OC-192 ring, use the "OC-192 Connection Procedure".

Recommendations

When working alone, the following connection procedure is recommended. However, the work will go much faster if two people work together. When two people are available, leave one person behind as one travels to the next site, then continue to travel separated by one node. This will allow the fiber connection returning to the first node to be established at the same time as the fiber connection leaving from the last node.

Example of BLSR Network
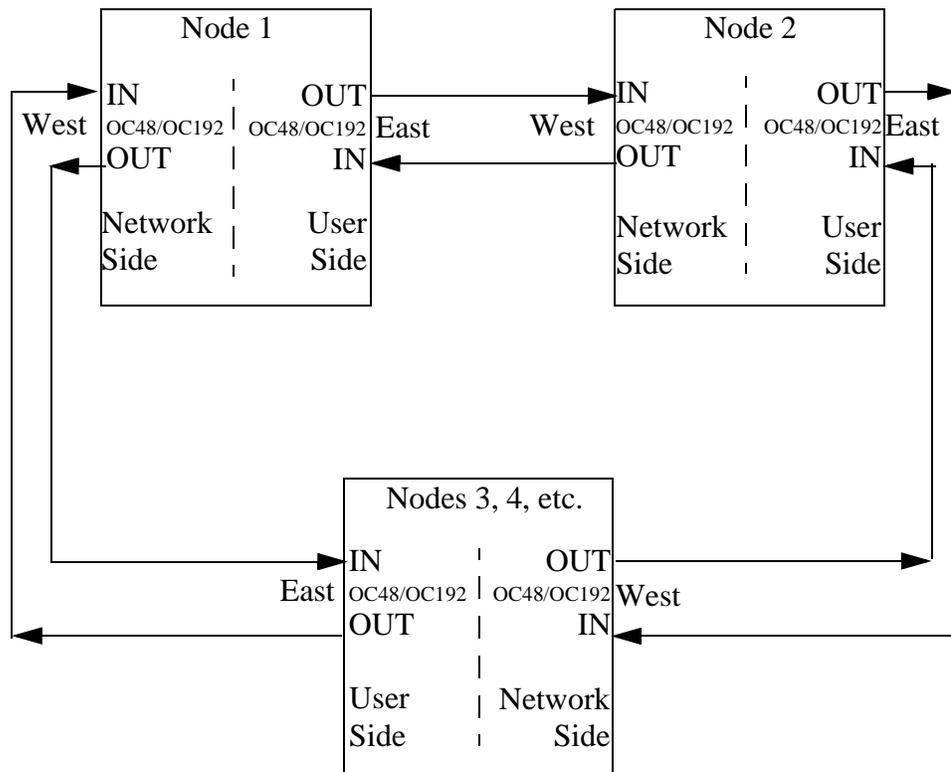
Figure 7-1.   The diagram above shows a sample 3-node BLSR.

High Level Ring Connection (Continued)

OC-48 Connection Procedure

Table 7-1. If installing a 2.5G OC-48 ring, perform the following procedure to connect the OC-48 fiber to complete the ring. The node at which you start will be the node where you end. Refer to Figure 7-1 for example BLSR.

Step	Action	Reference
1	Using a known-good 0dBm fiber jumper, measure and record the output power at the OUT port of the WEST OC-48 port unit of the first node.	Use Table 7-18 at end of chapter to record level.
2	Remove the jumper and clean and connect the appropriate fiber to the OUT port of the WEST OC-48 port unit.	Appendix A, and ED8C789-15 (for cable routing)
3	Move to the next adjacent node to the west.	
4	Follow the LBO selection procedure to determine and install the correct attenuation value for the IN port for the EAST OC-48 port unit.	See OC-48 LBO Selection: page 7-13
5	Connect this fiber to the IN port of the EAST OC-48 port unit. This should be the fiber from the WEST OC-48 that was just connected at the previous node.	Appendix A
6	Wait 20 seconds and remove the fiber. **Expected Result:** The red LED on the pack should blink, indicating that there was a valid signal on the IN port. Reconnect the fiber.	If the port unit receives a valid signal, it automatically transitions from Auto to Monitored mode. Then, if the signal is removed, the red LED will blink.
7	Repeat Steps 1 - 6 until you have gone all the way around the ring.	
8	At the first node, use a known-good 0dBm fiber jumper to measure and record the output power at the OUT port of the EAST OC-48 port unit.	Use Table 7-18 at end of chapter to record level.
9	Remove the jumper and clean and connect the appropriate fiber to the OUT port of the EAST OC-48 port unit.	Appendix A, and ED8C789-15 (for cable routing)
10	Move to the next adjacent node to the east.	
		Continued on next page

Step	Action	Reference
11	Follow the LBO selection procedure to determine and install the correct attenuation value for the IN port for the WEST OC-48 port unit.	See OC-48 LBO Selection: page 7-13
12	Connect this fiber to the IN port of the WEST OC-48 port unit. This should be the fiber from the EAST OC-48 that was just connected at the previous node.	Appendix A
13	Wait 20 seconds and remove the fiber. **Expected Result:** The red LED on the pack should blink, indicating that there was a valid signal on the IN port. Reconnect the fiber.	If the port unit receives a valid signal, it automatically transitions from Auto to Monitored mode. Then, if the signal is removed, the red LED will blink.
14	Repeat Steps 8 -13 until you have gone all the way around the ring.	
15	Setup Far End Communications	Setup Far End Communications: page 7-20
16	Setup Protection groups	BLSR Protection Group Setup: BLSR Protection Group Setup: page 7-24
17	At the WaveStar™ CIT, retrieve the ring map by selecting **View-->Rings -->Ring Map**	
18	Double click **WaveStar 2.5G/10G**, double click the **Ring ID**, click on the appropriate **2F BLSR**, and click **Select**.	
19	Verify the map is correct.	
20	**Stop! End of Task.**	

High Level Ring Connection (Continued)

OC-192 Connection Procedure

Table 7-2. If installing a 10G, perform the following procedure to connect the OC-192 fibers to complete the ring. Refer to Figure 7-1 for example BLSR.

Step	Action	Reference
1	Using a known-good 0dBm fiber jumper, measure and record the output power at the OUT port of the WEST OC-192 port unit of the first node.	Use Table 7-17 at end of chapter to record level.
2	Remove the jumper and clean and connect the appropriate fiber to the OUT port of the WEST OC-192 port unit.	Appendix A, and ED8C789-16 (for cable routing)
3	Move to the next adjacent node to the west.	
4	Follow the LBO selection procedure to determine and install the correct attenuation value for the IN port for the EAST OC-192 port unit.	See OC-192 LBO Selection: page 7-15
5	Connect this fiber to the IN port of the EAST OC-192 port unit. This should be the fiber from the WEST OC-192 that was just connected at the previous node.	Appendix A
6	Wait 20 seconds and remove the fiber. **Expected Result:** The red LED on the pack should blink, indicating that there was a valid signal on the IN port. Reconnect the fiber.	If the port unit receives a valid signal, it automatically transitions from Auto to Monitored mode. Then, if the signal is removed, the red LED will blink.
7	Repeat Steps 1 - 6 for all nodes around the ring.	
8	At the first node, use a known-good 0dBm fiber jumper to measure and record the output power at the OUT port of the EAST OC-192 port unit.	Use Table 7-17 at end of chapter to record level.
9	Remove the jumper and clean and connect the appropriate fiber to the OUT port of the EAST OC-192 port unit.	Appendix A, and ED8C789-16 (for cable routing)
10	Move to the next adjacent node to the east.	
11	Follow the LBO selection procedure to determine and install the correct attenuation value for the IN port for the WEST OC-192 port unit.	See OC-192 LBO Selection: page 7-15
		Continued on next page

Step	Action	Reference
12	Connect this fiber to the IN port of the WEST OC-192 port unit. This should be the fiber from the EAST OC-192 that was just connected at the previous node.	Appendix A
13	Wait 20 seconds and remove the fiber. **Expected Result:** The red LED on the pack should blink, indicating that there was a valid signal on the IN port. Reconnect the fiber.	If the port unit receives a valid signal, it automatically transitions from Auto to Monitored mode. Then, if the signal is removed, the red LED will blink.
14	Repeat Steps 8 -13 for all nodes around the ring.	
15	Setup Far End Communications.	Setup Far End Communications: page 7-20
16	Setup Protection groups.	BLSR Protection Group Setup: page 7-24
17	At the WaveStar™ CIT, retrieve the ring map by selecting **View-->Rings -->Ring Map**.	
18	Double click **WaveStar 2F 2.5G/10G**, double click the appropriate **Ring ID**, click on the appropriate **2F BLSR**, and click **Select**.	
19	Click on **Display Ring Map Graph** to see the graphical view. Verify the map is correct. Click **Close** to exit each window.	
20	**Stop! End of Task.**	

Optical Jumpers and Line Build Outs

Lightwave Jumpers   The following table includes available fiber jumpers with ST-type connectors on each end for use with testing. If other connector types are needed, refer to the ordering section of the Applications, Planning, and Ordering Guide.

Table 7-3.   ST-ST Fiber jumpers

Code	Comcode	Length	Description
FS1E-E-02	105 357 727	2 ft.	ST-ST
FS1E-E-10	105 357 768	10 ft.	ST-ST
FS1E-E-25	105 357 800	25 ft.	ST-ST
FS1E-E-50	105 357 859	50 ft.	ST-ST
FS1E-E-100	105 357 875	100 ft.	ST-ST

Optical Line Buildouts - SM-SM   WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) supports ST-type, FC-type, and SC-type connections to fiber. All port units are typically shipped with 0 dB ST-type attenuators. If the installation uses other than the ST-type optical interfaces, additional 0 dB lightguide buildouts of the proper type must be obtained to replace the factory equipped ST-type on the transmitter of the circuit packs.

Table 7-4.   Optical line buildouts available with ST-type connectors (SM-SM)

Code	Comcode	Loss (dB)
A3070	106 795 354	0 dB
A3070B	106 795 362	5 dB
A3070D	106 795 370	10 dB
A3070F	106 795 388	15 dB
A3070H	106 795 396	20 dB

Optical Jumpers and Line Build Outs (Continued)

Optical Line Buildouts - SM-SM (Continued)

Table 7-5.   **Optical line buildouts available with FC-type connectors (SM-SM).**

Code	Comcode	Loss (dB)
A3080	106 795 404	0 dB
A3080B	106 795 412	5 dB
A3080D	106 795 420	10 dB
A3080F	106 795 438	15 dB
A3080H	106 795 446	20 dB

Table 7-6.   **Optical line buildouts available with SC-type connectors (SM-SM)**

Code	Comcode	Loss (dB)
A3060	106 708 951	0 dB
A3060B1	106 708 969	5 dB
A3060D1	106 708 977	10 dB
A3060F1	106 708 985	15 dB
A3060H1	106 708 993	20 dB

Optical Jumpers and Line Build Outs (Continued)

Optical Line Buildouts - SM-MM

Table 7-7.   Optical line buildouts available with ST-type connectors (SM-MM)

Code	Comcode	Loss (dB)
A3070	106 795 354	0 dB
ASTM5.0	108 052 960	5 dB
ASTM10.0	108 052 994	10 dB
ASTM15.0	108 053 018	15 dB
ASTM20.0	108 053 042	20 dB

Table 7-8.   Optical line buildouts available with FC-type connectors (SM-MM)

Code	Comcode	Loss (dB)
A3080	109 795 404	0 dB
AFCM5	108 107 285	5 dB
AFCM10	108 107 301	10 dB
AFCM15	108 107 327	15 dB
AFCM20	108 107 343	20 dB

Table 7-9.   Optical line buildouts available with SC-type connectors (SM-MM)

Code	Comcode	Loss (dB)
A3060	106 708 951	0 dB
ASCM5	108 440 579	5 dB
ASCM10	108 440 595	10 dB
ASCM15	108 440 611	15 dB
ASCM20	108 440 637	20 dB

Optical Jumpers and Line Build Outs
(Continued)

**LC-type Optical
Line Buildouts -
SM-SM**

WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) supports LC-type connections
to fiber the Colored OC-192/STM64 circuit packs. All port units are typically shipped
with 0 dB LC-type attenuators.

Table 7-10.   Optical line buildouts available with LC-type connectors (SM-SM)

Comcode	Loss (dB)
108288473	5 dB
108288457	10 dB
108358169	15 dB
108358219	20 dB

OC-48 LBO Selection

**OC-48 LBO
Selection
Description**

This section covers the selection of LBOs to be used on the input to the OC-48 based on the received optical power. It is recommended that the LBO be placed on the IN since this is the furthest physical point on the fiber line from the OUT and takes all connector losses into account. In rare instances buildouts can be placed at the LGX, but this is NOT recommended. The Optical LBO selection procedure is to be used in conjunction with the Optical Fiber Connection Procedure.

**OC-48 LBO
Selection Procedure**

Table 7-11.   Perform the steps outlined below to choose the appropriate LBO:

Step	Action
1	At the input of the receiver, clean the fiber, then measure, and record for office records, the received optical power from the far-end transmitter. Be sure to set the optical power meter for the wavelength of the light to be measured (i.e. 1550 nm or 1310 nm). Table 7-18 at the end of the chapter can be used to record the power level.
2	For LEY7, LEY8, and POU port units continue, otherwise skip to step 4
3	Based on the measured value, choose the appropriate LBO value.
	Measured Received Power in dBm: · **Use Optical LBO Value:**

Measured Received Power in dBm:	Use Optical LBO Value:
1 to -4.9 dBm	15 dB
-5.0 to -9.9 dBm	10 dB
-10.0 to -14.9 dBm	5 dB
-15.0 to -21.5 dBm	0 dB
-21.6 to -25.9 dBm for 1.3μm -21.6 to -26.9 dBm for 1.5μm	Optical loss out of range. Refer to: Head End TRMTR Optical Power Check: page 7-18.
-26.0 and lower for 1.3μm -27.0 and lower for 1.5μm	Optical loss out of range. Replace outside plant fiber.

Step	Action
4	For LEY182 port units continue, otherwise skip to step 6

Step	Action
5	Based on the measured value, choose the appropriate LBO value.

Measured Received Power in dBm:	Use Optical LBO Value:
-1 to -7.9 dBm	0 dB
-8.0 to -13.9 dBm	Optical loss out of range. Refer to: Head End TRMTR Optical Power Check: page 7-18.
-14.0 dBm	Optical loss out of range. Replace outside plant fiber.

Step	Action
6	Remove the 0 dB line buildout in the faceplate IN Port of the OC-48 port unit. To remove, press the tab on the top of the buildout with a small blunt tool, and rotate the buildout counterclockwise slightly. Slide the buildout out along the angle it is installed in the faceplate.
7	Remove the 0 dB line buildout in the faceplate IN Port of the OC-48 port unit. To remove, press the tab on the top of the buildout with a small blunt tool, and rotate the buildout counterclockwise slightly. Slide the buildout out along the angle it is installed in the faceplate.
8	Install the chosen buildout. To install, remove the protective covers from the chosen buildout. Clean the buildout connection of any material or dust using alcohol and wipes. With the tab facing up towards you, slide the buildout into the faceplate of the IN jack at the angle of the connector block in the faceplate. The buildout can only be fully inserted when the tab is very slightly rotated counterclockwise. To lock the buildout in position, rotate the buildout clockwise until a small click is heard.
9	Check that the buildout is locked in position by lightly tugging at it.
10	Return to OC-48 Connection Procedure,Table 7-1.

OC-192 LBO Selection

OC-192 LBO Selection Description

This section covers the selection of LBOs to be used on the input to the OC-192 based on the received optical power. It is recommended that the LBO be placed on the IN since this is the furthest physical point on the fiber line from the OUT and takes all connector losses into account. In rare instances buildouts can be placed at the LGX, but this is NOT recommended. The Optical LBO selection procedure is to be used in conjunction with the Optical Fiber Connection Procedure.

OC-192 LBO Selection Procedure

Table 7-12.   Perform the steps outlined below to choose the appropriate LBO:

Step	Action
1	At the input of the receiver, clean the fiber, then measure and record (for office records) the received optical power from the far-end transmitter. Be sure to set the optical power meter for the wavelength of the light to be measured. (i.e. 1550 nm). Table 7-17 at the end of the chapter can be used to record the power level.
2	The LBO selection depends on the type of OC-192 pack being used. Use the following to determine what LBO to use.

LEY69 LEY284-LEY299 LEY384-LEY399	Option 1
LEY70	Option 2
LEY97	Option 3
LEY201-LEY280	Option 4
LEY67	Option 5

Step	Action
3	Option 1: Based on the measured value, choose the appropriate LBO value.

Measured Received Power in dBm:	Use Optical LBO Value:
0 to -3.9 dBm	15 dB
-4.0 to -8.9 dBm	10 dB
-9.0 to -13.9 dBm	5 dB
-14.0 to -16.9 dBm	0 dB
-17 to -20.9 dBm	Optical loss out of range. Refer to: Head End TRMTR Optical Power Check: page 7-18.
-21dBm and lower	Optical loss out of range. Replace outside plant fiber

Step	Action
4	Option 2: Based on the measured value, choose the appropriate LBO value.

Measured Received Power in dBm:	Use Optical LBO Value:
1 to -3.9 dBm	15 dB
-4.0 to -8.9 dBm	10 dB
-9.0 to -13.9 dBm	5 dB
-14.0 to -18.9 dBm	0 dB
-19 to -22.9 dBm	Optical loss out of range. Refer to: Head End TRMTR Optical Power Check: page 7-18.
-23 dBm and lower	Optical loss out of range. Replace outside plant fiber

Step	Action
5	Option 3: Based on the measured value, choose the appropriate LBO value.

Measured Received Power in dBm:	Use Optical LBO Value:
0 to -1.9 dBm	10 dB
-2.0 to -5.9	5 dB
-6.0 to -10.9 dBm	0 dB
-11 to -13.9 dBm	Optical loss out of range. Refer to: Head End TRMTR Optical Power Check: page 7-18.
-14 dBm and lower	Optical loss out of range. Replace outside plant fiber

Step	Action
6	Option 4: Based on the measured value, choose the appropriate LBO value.

Measured Received Power in dBm:	Use Optical LBO Value:
-5.0 to -8.9 dBm	10 dB
-9.0 to -14.9 dBm	5 dB
-15.0 to -19.9 dBm	0 dB
-19.9 to -21.9 dBm	Optical loss out of range. Refer to: Head End TRMTR Optical Power Check: page 7-18.
-22dBm and lower	Optical loss out of range. Replace outside plant fiber

Step	Action
7	Option 5: Based on the measured value, choose the appropriate LBO value.

Measured Received Power in dBm:	Use Optical LBO Value:
1 to -4.9 dBm	15 dB
-5.0 to -8.9 dBm	10 dB
-9.0 to -13.9 dBm	5 dB
-14.0 to -16.9 dBm	0 dB
-17 to -20.9 dBm	Optical loss out of range. Refer to: Head End TRMTR Optical Power Check: page 7-18.
-21dBm and lower	Optical loss out of range. Replace outside plant fiber

Step	Action
8	Remove the 0 dB line buildout in the faceplate IN Port of the OC-192 port unit. To remove, press the tab on the top of the buildout with a small blunt tool, and rotate the buildout counterclockwise slightly. Slide the buildout out along the angle it is installed in the faceplate.
9	Install the chosen buildout. To install, remove the protective covers from the chosen buildout. Clean the buildout connection of any material or dust using alcohol and wipes. With the tab facing up towards you, slide the buildout into the faceplate of the IN jack at the angle of the connector block in the faceplate. The buildout can only be fully inserted when the tab is very slightly rotated counterclockwise. To lock the buildout in position, rotate the buildout clockwise until a small click is heard.
10	Check that the buildout is locked in position by lightly tugging at it.
11	Return to OC-192 Connection Procedure, Table 7-2.

Head End TRMTR Optical Power Check

Head End TRMTR Optical Power Check Description

This procedure must be followed when the optical power reading at the IN jack falls below the suggested level.

When the optical power reading is below the recommended level at the receiver, and the head end TRMTR has an unknown output power level, the TRMTR power output may be between the ranges indicated in the table, as well as the possible line loss:

Transmitter	Pmax	Pmin
OC-192 1.5 short reach (LEY67)	2.0 dBm	-4.0 dBm
OC-192 1.5 intermediate reach (LEY69) and OC-192 1.5 intermediate short reach (LEY97) and OC192/STM64/POU (LEY201 - 240)	2 dBm	-1 dBm
OC192/STM64/1.5VLR1 (LEY295AE or LEY228AE Plus SEN4AE)	13 dBm	10 dBm
OC192/STM64/WDM (LEY284-299)	Refer to the *WaveStar 1.6T* Applications and Planning Guide (365-575-730)	
OC48/STM16/1.3VSR1 (LEY182)	-1 dBm	-6 dBm
OC48/STM16/1.3LR1 (LEY7) and OC48/STM16/1.5LR1 (LEY8)	3 dBm	-2 dBm
OC48/STM16/DWDM01-16 (LEY50 - LEY65) and OC48/STM16/WDM (LEY101 - LEY180)	Refer to the *Metropolis metroEON Applications and Planning Guide (365-575-300).*	
OC48/STM16/POU (LEY80AE - LEY95AE)	1 dBm	-2.8 dBm

Future replacement of transmitters may not work if the current transmitter is transmitting at Pmax and the replacement is Pmin.

Procedure to Check Head End Optical Power

Table 7-13. **To determine if a reading of less than the recommended at a RCVR is acceptable, follow the steps below:**

Step	Action
1	Measure and record the optical power at the head end TRMTR unit OUT jack on faceplate that feeds the line. The tables at the end of the chapter can be used to record the power level.
2	Calculate the line loss by subtracting the value measured at the receiver from the optical power measured at the transmitter.
	Continued on next page
3	If the line loss is greater than the levels in the table below, this line is unusable.

Port Unit:	Maximum Line Loss:
OC-192 1.5	15 dB
OC-48 1.3 and 1.5	24 dB
OC-12 1.3 long reach	26 dB
OC-3 1.3 long reach	28 dB
OC-3 and OC-12 1.3 short reach	12 dB

Step	Action
4	Return to OC-48 or OC-192 LBO Selection, Table 7-11 or Table 7-12.

Setup Far End Communications

Introduction
This section contains the procedure to setup DCC communications for proper ring communications.

Procedure to Provision Far End Communications for 2.5G

Table 7-14. **Follow the steps in the procedure below to set up Far-End communications for an OC-48 BLSR 2-Fiber. Refer to Figure 7-1 for example BLSR.**

⟹ **NOTE:**
 This procedure sets the West OC-48 to "Network Side" FECOM.

Step	Action
1	Connect to the NE with the CIT GUI using the Standard Login Procedure in Chapter 5.
2	Select **Configuration-->DCC Terminations**.
3	Click on the 2.5G **CP dccei (ADJCTL/DCCEI)** and click **Select**.
4	If the Network Element is Release 3 or earlier, continue to next step. If Release 4 or later, skip to step 10.
5	On the right side of the screen, verify that "Working Port AID" is the slot number of the WEST OC-48.
6	For **DCC Termination**, select **Enabled**. For **LAPD Role**, select **NETWORK-SIDE**. Then click **Apply**.
7	Click **Yes**, then click **Close**.
8	Repeat these steps for each node in the ring.
9	Return to High Level Ring Connection: page 7-6.
10	On the right side of the screen, at the top select the appropriate tab per the work order. Select: **Section DCC** to use the 3-byte DCC channel in the SONET Section Overhead, or **Line DCC** to use the 9-byte DCC channel if the SONET Line Overhead.
11	Select the **New Termination** radio button. This will display additional fields on the screen.
	Continued on next page

Step	Action
12	Click on **Select port for new DCC terminations...** This will display the "Select New DCC Termination Port" window.
13	From the "Select New DCC Termination Port" window, double click on one of the OC-48 circuit packs. Then double click on **Port 1**. **Expected Result:** "Port AID" will indicate the AID of the selected port. "Protection Port AID" will indicate "Unprotected".
14	Under "DCC Channel Parameters": For **DCC Termination:** Select the **Enabled** radio button. For **LAPD Role:** Select either **USER-SIDE** or **NETWORK-SIDE**, depending on the work order. Refer to Figure 7-1 for a network diagram example.
15	Click **Apply**.
16	Repeat the above steps for the other OC-48 circuit pack, setting the LAPD Role to the opposite of that selected above (i.e. one OC-48 port will be set as USER-SIDE, and the other as NETWORK-SIDE).
17	Click **Close**.
18	Return to High Level Ring Connection: page 7-6.

Setup Far End Communications
(Continued)

Procedure to Provision Far End Communications for 10G

Table 7-15. Follow the steps in the procedure below to set up Far-End communications for an OC-192 2-Fiber BLSR. Refer to Figure 7-1 for example BLSR.

⇒ **NOTE:**
This procedure sets the West OC-192 to "Network Side" FECOM.

Step	Action
1	Connect to the NE with the CIT GUI using the Standard Login Procedure in Chapter 5.
2	Select **Configuration-->DCC Terminations**.
3	Double click on **Shelf 2 (10G I/O)**, then click on **CP dccei (ADJCTL/DCCEI)** and click the **Select** button at the bottom of the left window.
4	If the Network Element is Release 3 or earlier, continue to next step. If Release 4 or later, skip to step 10.
5	Verify that "Working Port AID" is **1-2-u-#-trw-1**.
6	For **DCC Termination**, select **Enabled**. For **LAPD Role**, select **NETWORK-SIDE**. Then click **Apply**.
7	Click **Yes,** then click **Close**.
8	Repeat these steps for each node in the ring.
9	Return to High Level Ring Connection: page 7-8.
10	On the right side of the screen, at the top select the appropriate tab per the work order. Select: **Section DCC** to use the 3-byte DCC channel in the SONET Section Overhead, or **Line DCC** to use the 9-byte DCC channel if the SONET Line Overhead.
11	Select the **New Termination** radio button. This will display additional fields on the screen.
12	Click on **Select port for new DCC terminations...** This will display the "Select New DCC Termination Port" window.
	Continued on next page

Step	Action
13	From the "Select New DCC Termination Port" window, double click on one of the OC-192 circuit packs. Then double click on **Port 1**. **Expected Result:** "Port AID" will indicate the AID of the selected port. "Protection Port AID" will indicate "Unprotected".
14	Under "DCC Channel Parameters": For **DCC Termination:** Select the **Enabled** radio button. For **LAPD Role:** Select either **USER-SIDE** or **NETWORK-SIDE**, depending on the work order. Refer to Figure 7-1 for a network diagram example.
15	Click **Apply**.
16	Repeat the above steps for the other OC-192 circuit pack, setting the LAPD Role to the opposite of that selected above (i.e. one OC-192 port will be set as USER-SIDE, and the other as NETWORK-SIDE).
17	Click **Close**.
18	Return to High Level Ring Connection: page 7-8.

BLSR Protection Group Setup

Introduction

This procedure configures the bi-directional line switched ring (BLSR) protection groups.

Procedure to Provision BLSR Protection Group

Table 7-16. **Follow the steps in the following procedure to setup an OC-48 or OC-192 2F BLSR protection group. Refer to Figure 7-1 for example BLSR.**

Step	Action	
1	At the CIT select **Configuration-->Create New-->Protection Group**.	
2	Click on the appropriate shelf. Click **Select I/O Shelf**.	
3	For **Protection Type**, select **2 Fiber BLSR**.	
4	For **Protection Group AID**, enter a number from 01-99.	
5	Enter a **Ring ID** name. The Ring ID must be the same at each node in the ring.	
6	**If 2.5G shelf:**	**then:**
	East Port:	1-1-#-#-x-1 (where x=slot number of EAST OC-48 port unit)
	West Port:	1-1-#-#-y-1 (where y=slot number of WEST OC-48 port unit)
	If 10G shelf:	**then:**
	East Port:	1-2-#-#-tre-1
	West Port:	1-2-#-#-trw-1
7	Select a **Wait to Restore:** value. The default is 5 minutes.	
8	Click **Apply**.	
9	Click **Yes** to the warning box.	
10	Click **OK** to the next warning.	
11	Click **Close**.	
12	Repeat the above steps including setup for Far End Communications for each node in the ring.	
13	Return to High Level Ring Connection: page 7-6 or 7-8.	

Final Operations

Final Operations Description

After completing this section, the OC-48 and/or OC-192 ring turn up has been completed.

- Verify that only green LEDs are lighted on each of the 2.5G and 10G shelves in the ring.

- If you are not continuing on to the next chapter, re-connect the office alarm cables. Make sure that all cables are labeled, then install all appropriate bay frame closing details and equipment covers.

- Leave the office alarm cables disconnected for the testing in the next chapter.

After completing this chapter, continue with the next chapter, "Ring Testing".

Optical Output Power Measurements

OC-192 Optical Output Power

Table 7-17.   OC-192 TX levels

System TID	OC-192 (E or W) & Slot #	PORT 1 Power (dBm)

Optical Output Power Measurements (Continued)

OC-48 Optical Output Power

Table 7-18.   OC-48 TX levels

System TID	OC-48 (E or W) & Slot #	PORT 1 Power (dBm)

Optical Output Power Measurements (Continued)

OC-12 Optical Output Power

Table 7-19.   OC-12 TX levels

System TID	OC-12 Slot #	PORT 1 Power (dBm)	PORT 2 Power (dBm)

Optical Output Power Measurements (Continued)

OC-3 Optical Output Power

Table 7-20.   OC-3 TX levels

System TID	OC-3 Slot #	PORT 1 Power (dBm)	PORT 2 Power (dBm)	PORT 3 Power (dBm)	PORT 4 Power (dBm)

Ring Testing

8

Contents

Background

Introduction   This chapter tests and verifies the OC-48 ring for WaveStar TDM 2.5G and verifies the
OC-192 ring for WaveStar TDM 10G.

Objectives   This chapter provides information to perform the following:

1. Perform OC-48 and/or OC-192 line verification.

2. Final installation operations.

3. End-to-End Line Verification.

Related tasks and   For related tasks and information, refer to the appropriate 2.5G/10G User Operations
information   Guides (UOG) and Alarm Messages and Trouble Clearing Guides (AMTCG).

Testing Setup

General Considerations

⚠ **WARNING:**
Unterminated optical connectors may emit laser radiation. Do not view beam with optical instruments. Avoid direct exposure to beam.

- Disconnect the office alarms cable at the WaveStar 10G (OC-192) system before performing any tests. Reconnect the office alarms cable after completing tests.

- Be sure that each WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelf has completely passed all of the tests in the previous chapters of this document.

- Actual geographic East and West location of WaveStar® TDM 2.5G (OC-48) / 10G (OC-192) (2-Fiber) shelves and offices may not reflect the chosen fiber assignments for the particular ring installation, follow the fiber assignments given by maintenance engineering.

- A basic familiarity with the WaveStar™ CIT is assumed.

Tools, Test Sets and Accessories

Required equipment is listed in Chapter 1 of this document. An optical power meter is needed to perform the steps in this section.

OC-48 and OC-192 Line Verification

OC-48 and OC-192 Line Verification Description

The line verification procedures check optical line continuity between 2.5G/10G shelves of the OC-48/OC-192 ring. The tests in this section are performed only after all other tests in the manual have been performed. This chapter assumes that all fibers have been connected at each 2.5G/10G network element.

Example of BLSR Network for Line Verification Test
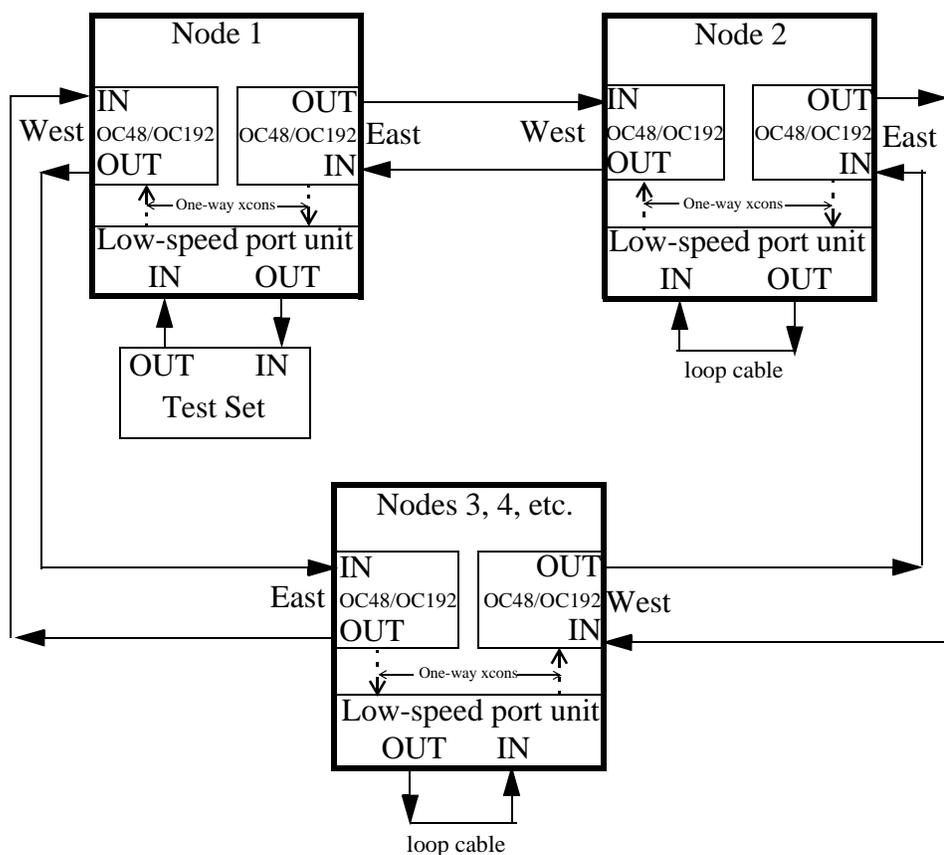
Figure 8-1. **The diagram above shows a sample 3-node BLSR with one-way cross-connections and loop cables for the Line Verification test.**

OC-48 and OC-192 Line Verification (Continued)

OC-48 and OC-192 Line Verification Procedure

Table 8-1.   **Perform the steps below:**

Step	Action
1	Disconnect office alarm cables if they are connected.
2	Login to any Network Element in the ring using the Standard Login Procedure in Chapter 5.
3	Retrieve the ring map by selecting **View-->Rings-->Ring Map**.
4	Double click on the appropriate system, ring, and 2F BLSR.
5	Click **Select**. Click on the **Graphical View** **Requirement:** The complete ring map is displayed.
6	Continue with the "Final Installation Operations" procedure.
7	**Stop! End of Task.**

Final Installation Operations

Final Installation Operations Description

These tests complete the operation tests at the ring level.

Final Installation Operations Procedure

Table 8-2.   Perform the steps below.

Step	Action
1	Verify that only green LEDs are lighted on each Network Element in the ring.
2	Retrieve Local Alarms: From the WaveStar™ CIT, click on **Alarm List** in the upper right hand corner of the screen.
3	Verify there are no active alarms.
4	Remote login to the NE to the east.
5	Repeat Steps 2-4 until all NEs in the ring have been checked.
6	Continue with the "End-to-End Line Verification" procedure.
7	**Stop! End of Task.**

End-to-End Line Verification

End-to-End Line Verification Description

This procedure verifies end-to-end transmission through the OC-48/OC-192 ring. A BERTS (Bit Error Rate Test Set) will monitor bit errors and line switches for an overnight soak (8 to 24 hours).

End-to-End Line Verification Procedure

Table 8-3.   Perform the steps below:

Step	Action
1	Login to each NE in the ring and repeat steps 2, 3, and 4 at each NE.
2	From the menu bar, select **Configuration-->Cross-Connection**.
3	Use the Cross-Connection Wizard to create a 1-way point-to-point STS-1 cross-connection from a low-speed port unit to the WEST port unit of the 2-Fiber BLSR. Refer to Figure 8-1 for an example.
4	Create another 1-way point-to-point STS-1 cross-connection from the EAST port unit of the 2-Fiber BLSR to the same tributary of the same low-speed port unit in the previous step. Refer to Figure 8-1 for an example.
5	Once all cross-connections have been made, at the local node connect the output of an appropriate test set to the IN connector of the low-speed port unit chosen above. Refer to Figure 8-1.
6	Connect the input of the test set to the OUT connector of the same port of the same low-speed port unit. Refer to Figure 8-1.
7	At the other nodes, loop the IN and OUT of the low-speed port using the appropriate jumper (coax or fiber) and LBO, if applicable. Refer to Figure 8-1
8	Inject a single error at the test set. **Requirement**: Single error is received.
9	Perform a BLSR manual switch as follows: At the CIT, choose **Fault-->Protection Switch**. Click on the "Ptn Grp" tab at the bottom. Click on the appropriate BLSR, then click on **Select**. Select the EAST direction. For **Switch Type**, select **Manual to Protection, Ring**. Click **Apply**, then click Yes. **Requirement**: Test set shows a hit.
	Continued on next page

Step	Action
10	Clear errors from test set.
11	At the CIT, follow step 9, selecting a **Switch Type** of **Clear** to Clear the Manual Switch. **Requirement**: Test set shows a hit.
12	Clear errors from test set.
13	Repeat Steps 9 - 12 for the WEST direction.
14	Login to the node to east.
15	Repeat Steps 9 - 14 until all nodes in the ring have been tested.
16	At the local node, remove the fibers from the east transmitter. **Requirement:** The test set shows a hit.
17	Clear errors.
18	Reconnect fibers. **Requirement:** After the Wait-to-Restore period (default is 5 minutes), the ring switches back and the test set shows a hit.
19	Clear errors.
20	Remove fibers from west transmitter. **Requirement:** The test set shows a hit.
21	Clear errors.
22	Reconnect fibers. **Requirement**: After the Wait-to-Restore period (default is 5 minutes), the ring switches back and the test set shows a hit.
23	Wait for alarms to clear and retrieve Network alarms. Clear errors on test set. **Requirement:** No alarms in ring.
24	Leave the test set setup for 8-24 hours to verify that there are no errors. **Requirement:** No hits on test set.
25	Leave the test setup intact and continue with the next procedure "Verify System Timing Protection".
26	**Stop! End of Task.**

Verify System Timing Protection

Introduction   After transmission has been established and verified, the 1+1 timing needs to be tested and verified on all Network Elements. Also, the timing reference will be verified on Network Elements that are externally timed. The following procedure tests both the timing hardware and timing reference integrity.

Procedure to verify system timing   Follow the steps in this procedure to verify synchronization integrity.

Step	Action
1	At the CIT, select **Fault-->Protection Switch**.
2	If necessary, double click on **Bay 1** to expand, then double click on **Shelf 1** to expand. Click on one of the "CP tmg" circuit packs (either tmg1 or tmg0), then click on **Select**. **Expected Result:** CIT displays "Protection Switch" window.
3	Under "Switch Status", note which side is "Active".

If the Active Side is:	Then:
Side 0	switch the equipment timing group to side 1 by selecting a **Switch Type** of **Manual to Side 1**. Click on **Apply**, then click **Yes**.
Side 1	switch the equipment timing group to side 0 by selecting a **Switch Type** of **Manual to Side 0**. Click on **Apply**, then click **Yes**.

Step	Action
4	Observe Test Set and verify transmission and no alarms on the NE.
5	At the CIT, select **View-->Timing/Sync**. Click on the "System Timing" tab. Under "Clock":

If the **Provisioned Clock Mode** is:	Then:
Free Running	Click **Close** and go to step 14.
Locked	Click on the "Timing Reference" tab and make note of the Active Timing Reference.

Continued on next page

Step	Action	
6	If the **Active Timing Reference** is:	Then:
	line1 or line2	Click **Close**, then go to Step 14.
	extref1 or extref2	Click **Close**, then continue with next step.
7	At the CIT, select **Fault-->Timing/Sync Protection Switch-->System Timing Reference Switch**. The "System Timing Reference Switch" window is displayed.	
8	For **Switch Type**, select **Manual Switch to Reference**. This will cause the "Timing Reference" field to be displayed.	
9	If the Timing Reference noted in step 5 was:	Then:
	extref1	For **Timing Reference**, select **extref2**. Click **OK**, then click **Yes**.
	extref2	For **Timing Reference**, select **extref1**. Click **OK**, then click **Yes**.
10	Observe Test Set and verify transmission and no alarms on the NE.	
11	Using the CIT, select **Fault-->Timing/Sync Protection Switch-->System Timing Reference Switch**.	
12	For **Switch Type**, select **Clear Reference Switch**. Click **OK**, then click **Yes**.	
13	Observe Test Set and verify transmission and no alarms on the NE.	
14	Repeat steps 1 to 13 for all Network Elements.	
15	Continue with the next procedure "Verify System Switch Fabric."	

Verify System Switch Fabric

Introduction   After transmission has been established and verified, the switch fabric needs to be tested and verified on all Network Elements.

Procedure to verify switch fabric   Follow the steps in this procedure to verify switch fabric integrity.

Step	Action
1	At the CIT, select **Fault-->Protection Switch**.
2	Expand the "1+1 Equipment esysswitchgrp", then click on "Side 0", then click **Select**. **Expected Result:** CIT displays "Protection Switch" window.
3	Under "Switch Status", note which side is "Active".

If the Active Side is:	Then:
Side 0	switch the equipment group to side 1 by selecting a **Switch Type** of **Manual to Side 1**. Click on **Apply**, then click **Yes**.
Side 1	switch the equipment group to side 0 by selecting a **Switch Type** of **Manual to Side 0**. Click on **Apply**, then click **Yes**.

Step	Action
4	Observe Test Set and verify transmission and no alarms on the NE.
5	Expand the "1+1 Equipment esysswitchgrp", then click on "Side 0", then click **Select**. **Expected Result:** CIT displays "Protection Switch" window.
6	For **Switch Type**, select **Clear**. Click **OK**, then click **Yes**.
7	Observe Test Set and verify transmission and no alarms on the NE.
8	Repeat steps 1 to 13 for all Network Elements.
9	Remove test set, loopback, and cross-connections at each node.
10	*Continued on next page*

Step	Action
11	If there are Loss of Signal alarms, set the appropriate ports to "Auto" to clear: At the CIT, right-click on the alarming "LED" of each port unit. Select **Provision Port x** (where x is the number of the alarming port). Under "Fault Management", for **Port Mode**, select **Auto**. Click **OK**, then click **Yes**.
12	Retrieve alarms. **Requirement**: No alarms.
13	Logout of the NE using the procedure in Chapter 5.
14	Continue with "Final Operations"

Final Operations

Description   After completing this chapter, the ring is completed and verified to be free of any alarms.

Make sure that all cables are labeled, then install all appropriate bay frame closing details and equipment covers.

Ring Testing Exit Checklist

Exit Checklist   The following provides a checklist to be completed after the completion of the Ring Testing. Verify that each procedure has been completed, check off, and initial the item

Completed	Initials	Procedure	Notes
		High Level Ring Connection	
		Optical Jumpers and Line Build Outs	
		OC-48 LBO Selection	
		OC-192 LBO Selection	
		Head End TRMTR Optical Power Check	
		Setup Far End Communications	
		BLSR Protection Group Setup	
		Optical Output Power Measurements	
		OC-48 and OC-192 Line Verification	
		Final Installation Operations	
		End-to-End Line Verification	
		Verify System Timing Protection	
		Verify System Switch Fabric	

NCC Installation in 2.5G Bay Frame
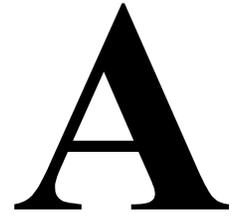
A

Contents

Background

Introduction   This chapter provides the information needed to install the NCC into a 2.5G system frame, and cable from the 2.5G and the NCC to a hub unit. The NCC shelf should be the last shelf installed in the frame and should rest on top of the heat baffle of the second 2.5G shelf. Refer to Figure 1-1 and Figure 1-2 for views of the NCC shelf.

Objectives   This chapter provides information to install the following:

1.   NCC in the bay frame with WaveStar™ 2.5G shelves

2.   LAN cables from the 2.5G to the external hub (e.g. NETGEAR 16-port 10BT Hub EN516NA, requires extenders for in-bay installation)
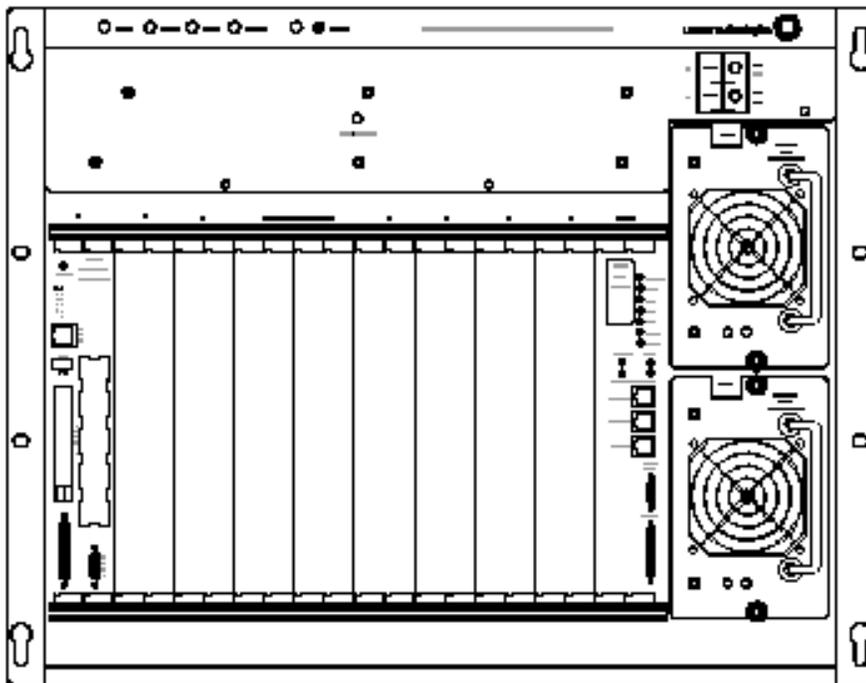
NCC Shelf Diagram

Figure 1-1.   NCC Shelf

Background (Continued)

**View of NCC Shelf
in Bay Frame**

The figure below shows the NCC installed in a bay frame.

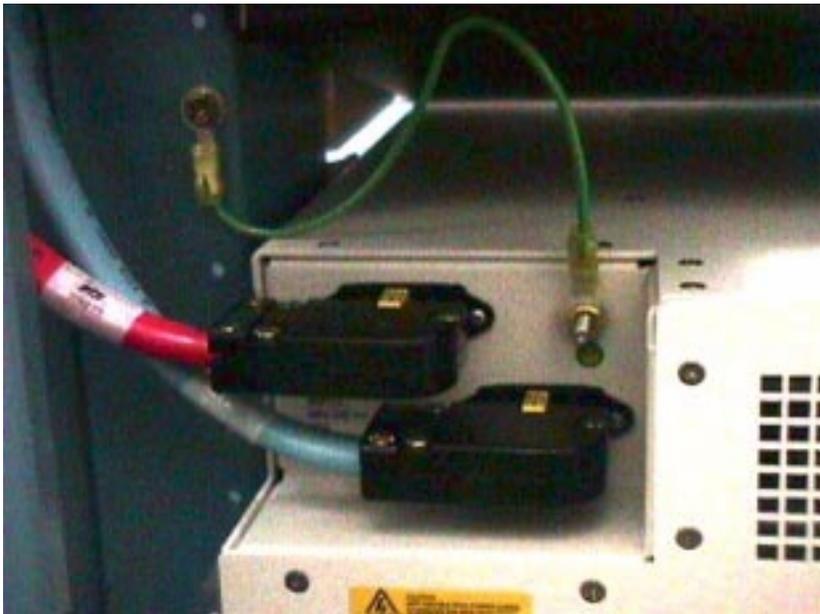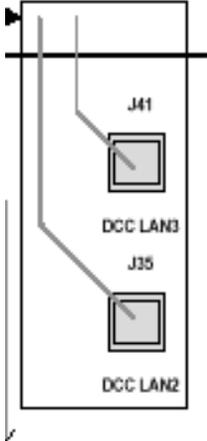**Figure 1-2.   View of NCC Shelf in bay frame.**

NCC Installation

Introduction   This section provides the information to install the NCC into the bay frame with the WaveStar™ 2.5G.

Procedure to Install NCC Shelf

Table 1-1.   Follow the steps below to install the NCC shelf.

Step	Action
1	If the NCC is already installed and powered, proceed to step 4.
2	Install the NCC shelf above the heat baffle of the second 2.5G shelf. The NCC will be the top-most shelf in the frame. Do not leave any spaces between the baffle and the bottom of the NCC. Secure it with four (4) screws on each side.
3	Install the A and B power feeders onto the NCC shelf from the rear. The red power cable is connected to the top power connector, the blue is connected to the bottom power connector.
	Continued on next page

Step	Action
4	To connect the NCC to the external hub unit, use a **straight** LAN cable to connect from the front of the first NCC circuit pack to the hub.
5	To connect each 2.5G Network Element to the NCC via the hub, use a **cross-over LAN cable** to connect J41 (DCC LAN2) or J35 (DCC LAN3) at each 2.5G to the external hub.
6	Turn up the NCC using the procedure in the Installation, Test, and Turn-up chapter of the NCC User's Guide (365-370-107, Issue 2 or later).
7	**Stop! End of Task.**

Installation Troubleshooting

B

Contents

Background

Introduction   This chapter provides basic installation troubleshooting information for the 2.5G and 10G systems.

Objectives   This chapter provides the following information:

1.   Troubleshooting table.

2.   Power Distribution Resistance Measurement.

Related tasks and information   For related tasks and information, refer to the appropriate 2.5G/10G User Operations Guides (UOG) and Alarm Messages and Trouble Clearing Guides (AMTCG).

Troubleshooting Table

Installation Troubleshooting Information

Table 2-1. **The following table provides information on installation troubleshooting.**

Trouble or Error Message	Probable Cause	Suggested Solution
Cross connected signals do not reach the correct port	Loose ribbon cable. Ribbon cable connected to the wrong port. Ribbon cable has bent pins. Crossed coax cables. Loose coax connector. Loose DS3/EC1 connector. Loose wing connector.	Firmly connect the ribbon cable, or coax cables. Verify the cables are connected to the correct jack.
Wrong port transitions from Auto to Monitored	Loose ribbon cable. Ribbon cable connected to the wrong port. Crossed coax cables. Loose coax connector. Loose DS3/EC1 connector. Loose wing connector.	Firmly connect the ribbon cable, or coax cables. Verify the cables are connected to the correct jack.
LOS signal at receiver.	Attenuated fiber.	Measure received power, and verify the attenuation at the receiver.
Flashing LED on optical receiver.	Attenuated fiber.	Measure received power, and verify the attenuation at the receiver.
DCC Section Failure, and User-Network Side Sect Failure	Incorrect BLSR Fiber Connections. Incorrect provisioning, with network/user side disabled. Attenuated fiber.	Verify the fibers are connected to the correct OC-48 or OC-192 cards. Verify received optical power.

Trouble or Error Message	Probable Cause	Suggested Solution
Can't connect CIT	PC not powered down after OSI Drivers installed for CIT.	Click on Start-->Shut Down, and power off the PC. Choosing the "restart" option doesn't power the PC off. The PC will need to be powered on after the power down.
"OSI Association failed."	LAN card not working properly or LAN cable bad.	Verify the proper installation of the LAN card. Check the event viewer. Verify the link is up between the PC and the shelf.
DS3 Protection switch not consistent	DS3 protection switch is being performed by extracting circuit pack without a manual switch being performed first.	Perform a manual switch via the CIT prior to pulling the circuit pack.

Power Distribution Resistance Measurement

Description

This procedure should be performed if the shelf powering procedure was unsuccessful.

Procedure to Measure Power Distribution Resistance

Table 2-2.   **Follow the steps below:**

Step	Action
1	Power should not be applied to the shelf.
2	Using an ohmmeter, measure the resistance from each power feed to shelf ground. **Requirement**: With the battery feed cables connected as indicated in the shelf powering procedure, the resistance should show a closed circuit (less than 1 ohm) for each power feed. If this requirement is not met, check that connections at the BDFB ground are secure and corrosion free, that all splices and crimps are secure, and that the proper gauge of wire was used.
3	**Stop! End of Task.**

Summary

Description   This section contains Troubleshooting procedures. If the problem you are experiencing is not listed here, refer to the 2.5G/10G User Operations Guides (UOG) or Alarm Message and Trouble Clearing Guides (AMTCG) listed in Chapter 1.

Fiber Cleaning

C

Contents

Background

Introduction
This procedure describes the Lucent recommended method for the cleaning and inspection of optical connectors using specific tools and materials that have been proven to be effective in the assembly and testing of optical transmission equipment. It is critical that the connector end faces are clean and free from particular contamination to assure proper performance and reliability of lightwave systems. With the modern high speed, high power and wider bandwidth optical transmission systems, clean connectors along the optical path are absolutely essential for successful operation.

Objectives
This chapter provides information to perform the following:

1.   Properly clean an optical connector

2.   Inspect an optical connector for cleanliness

Related Information
A course on connector cleaning and the connector inspection process is now offered through Lucent Technologies Learning and Performance Center, Course Code: LMC200H "Understanding Fiber Optic Cleaning, Inspection and Testing." To learn more about this course, consult your local Lucent Account Representative.

Equipment Required

For proper cleaning, the following equipment and materials are recommended:

Product	Model	Comcode	ITE #	Installation Order #
Optical Fiber Scope	Noyes OFS 300-200X	408197028	ITE-7129	33712900
Individual pre-saturated alcohol wipes	99% pure isopropyl alcohol	901375147	ITE-7136	33713600
CLETOP Cleaning Cassette	Type A Reel	901375154	ITE-7137	33713700
CLETOP Cleaning Cassette Replacement Reel	Type A Reel	901375014	ITE-7137 D1	33713701
Luminex Stick port cleaners	1.25 mm	901375030	ITE-7134	33713400
Luminex Stick port cleaners	2.5 mm	901375022	ITE-7135	33713500
Luminex Cloth	5.5" x 5.5"	408201226	R6033	23603300

⟹ NOTE:

The equipment and material listed above has been tested and is proven effective when used in conjunction with this procedure. Substitution of equipment or materials is at the discretion of the user and is not recommended by Lucent.

Safety Instructions

⚠ WARNING:
Never view an energized optical cable with the naked eye or with an optical magnifying instrument. Disconnected or separated optical connectors may emit invisible laser radiation and direct exposure can severely injure the eye. If inspecting the end face of a connector with a fiberscope, be absolutely certain that the system is deactivated.

⚠ WARNING:
Alcohol is flammable and is harmful if swallowed, inhaled or absorbed through the skin. Keep alcohol away from heat, sparks, or flame. Avoid contact with eyes, skin and clothing.

Cleaning/Inspecting Optical Connectors

Introduction The procedure that follows utilizes the "Wet/Dry" method for connector cleaning. This method first applies a "wet" solvent such as high purity alcohol to the connector end face to dissolve/remove any organic particulate or oily films, followed by a "dry" double clean wipe using the CLETOP cleaning cassette.

This procedure is recommended for connector ferrules 2.5 mm and 1.25 mm in diameter associated with ST, SC, FC, and LC connectors. The ferrule of a fiber optic connector consists of a ceramic or stainless steel cylinder with a hole located longitudinally down the center of its axis, allowing enough tolerance for a fiber to pass through.

All optical connectors should be cleaned prior to connectorization. Keep the protective ferrule dust cap in place on the connector until initiating the cleaning process.

Cleaning Process The following cleaning procedure is acceptable for field service/installation activities.

Step	Action
1	Remove the dust cap from the connector ferrule exposing the end face of the connector.
	Continued on next page

Cleaning/Inspecting Optical Connectors (Continued)

Step	Action
2	Open an individual foil packet of pre-saturated isopropyl alcohol (99% pure) wipe. Grasp the connector housing and place the connector ferrule end face perpendicular to the alcohol wipe. Drag it against the wipe three (3) times in a figure eight pattern. This action applies the alcohol solvent to the end face and initially loosens and scrubs away organic/solid contaminates.
	Continued on next page

Cleaning/Inspecting Optical Connectors
(Continued)

Step	Action
3	If a CLETOP cassette cleaner is not available, proceed with step 7. Otherwise, hold the CLETOP cassette cleaner in the palm of your hand with the cassette shutter door facing up. Rotate the cassette lever all the way down with your thumb. Do not release the lever. The lever advances the "dry" Luminex cleaning cloth inside the case and simultaneously opens the shutter. The CLETOP cassette shutter door is now open and ready for cleaning the connector.
4	Insert and press the connector ferrule end face perpendicular against the cleaning cloth in the first of two slots of the cleaner. Drag it down in the direction indicated by the arrows on the cleaner. Do not release the lever of the cassette.
5	Lift the connector from the first slot and rotate it 90 degrees and repeat the wiping procedure using the second slot. Be sure the ferrule is pressed snug against the cleaning cloth while dragging the ferrule to assure the proper cleaning action.
6	Release the cassette lever allowing the shutter door to close to its initial position. Continue with step 8.
	Continued on next page

Cleaning/Inspecting Optical Connectors (Continued)

Step	Action
7	Wrap a Luminex cleaning cloth around the ferrule and rotate the connector housing, cleaning the outside periphery of ferrule. Follow this by folding an unused portion of the cloth over the end of the ferrule end face and then with light pressure from the thumb, slightly drag the cloth from the center of the ferrule to the edge while rotating the connector 360 degrees. If the Luminex cleaning cloth is not available, a lint free cleanroom optic wipe can be used. The Luminex cleaning cloth is washable and can be used multiple times. The optic wipes are single use and disposable.
8	Inspect the connector for cleanliness. If necessary, repeat the cleaning process.
9	**Stop! End of Task.**

Connector Inspection

After cleaning the connector, inspect the ferrule end face to ensure that it is free from any particulate contamination using an optical fiber inspection scope of at least 200X magnification. When using an optical fiber scope (for example, the Noyes OFS 300-200X) exercise extreme caution to assure fiber being examined is de-energized.

⚠️ **WARNING:**
Use an optical power meter to verify the connector and fiber to be cleaned has been de-energized/deactivated before viewing.

Step	Action
1	Follow the instructions in the manual provided with the Optical Fiber Scope to view the ferrule end face of the fiber under inspection.
2	The visual area of the ferrule end face (ferrule and fiber) as observed by the inspection system/scope should be free of any contaminates. If contaminates are observed, repeat the "dry" CLETOP cleaning process again (Steps 3-6 of Cleaning Process).
	Continued on next page

Cleaning/Inspecting Optical Connectors (Continued)

Step	Action
3	After the connector has been verified to be cleaned, it should be immediately inserted into the adapter buildout of the optical component. This will assure maximum cleanliness and effectiveness of the connector.
4	If the cleaned connector can not be "connectorized" with a corresponding adapter, the connector ferrule must be protected with a connector dust cap. Before placing the cap on the ferrule, make sure the cap is clean. This can be accomplished by inserting a CLETOP stick cleaner (swab) of the same inside diameter as the cap (either 2.5 or 1.25 mm) and rotate the stick 360 degrees three (3) times. Following this procedure, carefully place the cap over the ferrule. When the cleaned connector is ready for assembly, it should be re-inspected for cleanliness prior to connectorization.
5	**Stop! End of Task.**

Optical Fiber Adapters and Circuit Pack Connectors

During testing and/or trouble shooting activities it may be necessary to clean the optical buildout adapter and the circuit pack connector. The following procedure is recommended.

Step	Action
1	Using the appropriate CLETOP stick cleaner (2.5 mm for SC, ST, and FC connectors, 1.25 mm for LC connectors) dampen the stick cleaner with Ethyl alcohol using the alcohol wipe. Insert the stick cleaner into the adapter rotating the stick 360 degrees while inserting. Push/rotate stick until the stick cleaner makes contact with the connector. Apply slight pressure upon contact and rotate stick 360 degrees at least three (3) times.
2	Remove the stick cleaner rotating it upon removal.
3	Using a dry CLETOP stick cleaner of appropriate diameter, repeat the above cleaning procedure. This procedure will clean the sidewalls of the adapter and the end face of the circuit pack connector.
4	**Stop! End of Task.**